Figure 1

Tomato Leaf DHS cDNA sequence

seq ID 1 NT
seq ID 2 AA

```
CGCAGAAACTCGCGGCGGCAGTCTTGTTCCGTACATAATCTTGGTCTGCAATAATGGGAGAAGCTCTGAAGTACAGTATCATGGAC
                                                                  M  G  E  A  L  K  Y  S  I  M  D
TCAGTAAGATCGGTAGTTTTCAAAGAATCCGAAAATCTAGAAGGTTCTTGCACTAAAATCGAGGGCTACGACTTCAATAAAGGCGT
 S  V  R  S  V  V  F  K  E  S  E  N  L  E  G  S  C  T  K  I  E  G  Y  D  F  N  K  G  V
TAACTATGCTGAGCTGATCAAGTCCATGGTTTCCACTGGTTTCCAAGCATCTAATCTTGGTGACGCCATTGCAATTGTTAATCAAA
  N  Y  A  E  L  I  K  S  M  V  S  T  G  F  Q  A  S  N  L  G  D  A  I  A  I  V  N  Q
TGCTAGATTGGAGGCTTTCACATGAGCTGCCCACGGAGGATTGCAGTGAAGAAGAAAGAGATGTTGCATACAGAGAGTCGGTAACC
M  L  D  W  R  L  S  H  E  L  P  T  E  D  C  S  E  E  E  R  D  V  A  Y  R  E  S  V  T
TGCAAAATCTTCTTGGGGTTCACTTCAAACCTTGTTTCTTCTGGTGTTAGAGACACTGTCCGCTACCTTGTTCAGCACCGGATGGT
 C  K  I  F  L  G  F  T  S  N  L  V  S  S  G  V  R  D  T  V  R  Y  L  V  Q  H  R  M  V
TGATGTTGTGGTTACTACAGCTGGTGGTATTGAAGAGGATCTCATAAAGTGCCTCGCACCAACCTACAAGGGGGACTTCTCTTTAC
  D  V  V  V  T  T  A  G  G  I  E  E  D  L  I  K  C  L  A  P  T  Y  K  G  D  F  S  L
CTGGAGCTTCTCTACGATCGAAAGGATTGAACCGTATTGGTAACTTATTGGTTCCTAATGACAACTACTGCAAATTTGAGAATTGG
P  G  A  S  L  R  S  K  G  L  N  R  I  G  N  L  L  V  P  N  D  N  Y  C  K  F  E  N  W
ATCATCCCAGTTTTTGACCAAATGTATGAGGAGCAGATTAATGAGAAGGTTCTATGGACACCATCTAAAGTCATTGCTCGTCTGGG
 I  I  P  V  F  D  Q  M  Y  E  E  Q  I  N  E  K  V  L  W  T  P  S  K  V  I  A  R  L  G
TAAAGAAATTAATGATGAAACCTCATACTTGTATTGGGCTTACAAGAACCGGATTCCTGTCTTCTGTCCTGGCTTGACGGATGGAT
  K  E  I  N  D  E  T  S  Y  L  Y  W  A  Y  K  N  R  I  P  V  F  C  P  G  L  T  D  G
CACTTGGTGACATGCTATACTTCCATTCTTTCAAAAAGGGTGATCCAGATAATCCAGATCTTAATCCTGGTCTAGTCATAGACATT
S  L  G  D  M  L  Y  F  H  S  F  K  K  G  D  P  D  N  P  D  L  N  P  G  L  V  I  D  I
GTAGGAGATATTAGGGCCATGAATGGTGAAGCTGTCCATGCTGGTTTGAGGAAGACAGGAATGATTATACTGGGTGGAGGGCTGCC
 V  G  D  I  R  A  M  N  G  E  A  V  H  A  G  L  R  K  T  G  M  I  I  L  G  G  G  L  P
TAAGCACCATGTTTGCAATGCCAATATGATGCGCAATGGTGCAGATTTTGCCGTCTTCATTAACACCGCACAAGAGTTTGATGGTA
  K  H  H  V  C  N  A  N  M  M  R  N  G  A  D  F  A  V  F  I  N  T  A  Q  E  F  D  G
GTGACTCTGGTGCCCGTCCTGATGAAGCTGTATCATGGGGAAAGATACGTGGTGGTGCCAAGACTGTGAAGGTGCATTGTGATGCA
S  D  S  G  A  R  P  D  E  A  V  S  W  G  K  I  R  G  G  A  K  T  V  K  V  H  C  D  A
ACCATTGCATTTCCCATATTAGTAGCTGAGACATTTGCAGCTAAGAGTAAGGAATTCTCCCAGATAAGGTGCCAAGTTTGAACATT
 T  I  A  F  P  I  L  V  A  E  T  F  A  A  K  S  K  E  F  S  Q  I  R  C  Q  V
GAGGAAGCTGTCCTTCCGACCACACATATGAATTGCTAGCTTTTGAAGCCAACTTGCTAGTGTGCAGCACCATTTATTCTGCAAAA
CTGACTAGAGAGCAGGGTATATTCCTCTACCCCGAGTTAGACGACATCCTGTATGGTTCAAATTAATTATTTTTCTCCCCTTCACA
CCATGTTATTTAGTTCTCTTCCTCTTCGAAAGTGAAGAGCTTAGATGTTCATAGGTTTTGAATTATGTTGGAGGTTGGTGATAACT
GACTAGTCCTCTTACCATATAGATAATGTATCCTTGTACTATGAGATTTTGGGTGTGTTTGATACCAAGGAAAAATGTTTATTTGG
AAAACAATTGGATTTTTAATTTATTTTTTCTTGTTTAAAAAAAAAAAAAAAAAAAAAAAA
```

Arabidopsis DeoxyHypusine Synthase (DHS) Predicted Sequence

Figure 2A

SEQ ID 5 = NT

```
GAACTCCCAAAACCCTCTACTACTACACTTTCAGATCCAAGGAAATCAATTTTGTCATTCGAGCAACATGG
                                                                M
AGGATGATCGTGTTTTCTCTTCGGTTCACTCAACAGTTTTCAAAGAATCCGAATCATTGGAAGGAAAGTGT
E  D  D  R  V  F  S  S  V  H  S  T  V  F  K  E  S  E  S  L  E  G  K  C
GATAAAATCGAAGGATACGATTTCAATCAAGGAGTAGATTACCCAAAGCTTATGCGATCCATGCTCACCAC
 D  K  I  E  G  Y  D  F  N  Q  G  V  D  Y  P  K  L  M  R  S  M  L  T  T
CGGATTTCAAGCCTCGAATCTCGGCGAAGCTATTGATGTCGTCAATCAAATGGTTCGTTTCTCGAATTCAT
  G  F  Q  A  S  N  L  G  E  A  I  D  V  V  N  Q  M
CAAAAATAAAAATTCCTTCTTTTTGTTTCCTTTGTTTTGGGTGAATTAGTAATGACAAAGAGTTTGAATT
                                                          F  E  F
TGTATTGAAGCTAGATTGGAGACTGGCTGATGAAACTACAGTAGCTGAAGACTGTAGTGAAGAGGAGAAGA
  V  L  K  L  D  W  R  L  A  D  E  T  T  V  A  E  D  C  S  E  E  E  K
ATCCATCGTTTAGAGAGTCTGTCAAGTGTAAAATCTTTCTAGGTTTCACTTCAAATCTTGTTTCATCTGGT
N  P  S  F  R  E  S  V  K  C  K  I  F  L  G  F  T  S  N  L  V  S  S  G
GTTAGAGATACTATTCGTTATCTTGTTCAGCATCATATGGTTTGTGATTTTTGCTTTATCACCCTGCTTTT
 V  R  D  T  I  R  Y  L  V  Q  H  H  M
TTATAGATGTTAAAATTTTCGAGCTTTAGTTTTGATTTCAATGGTTTTTCTGCAGGTTGATGTTATAGTCA
                                                    V  D  V  I  V
CGACAACTGGTGGTGTTGAGGAAGATCTCATAAAATGCCTTGCACCTACATTTAAAGGTGATTTCTCTCTA
T  T  T  G  G  V  E  E  D  L  I  K  C  L  A  P  T  F  K  G  D  F  S  L
CCTGGAGCTTATTTAAGGTCAAAGGGATTGAACCGAATTGGGAATTTGCTGGTTCCTAATGATAACTACTG
 P  G  A  Y  L  R  S  K  G  L  N  R  I  G  N  L  L  V  P  N  D  N  Y  C
CAAGTTTGAGGATTGGATCATTCCCATCTTTGACGAGATGTTGAAGGAACAGAAAGAAGAGGTATTGCTTT
  K  F  E  D  W  I  I  P  I  F  D  E  M  L  K  E  Q  K  E  E
ATCTTTCCTTTTTATATGATTTGAGATGATTCTGTTTGTGCGTCACTAGTGGAGATAGATTTTGATTCCTC
TCTTGCATCATTGACTTCGTTGGTGAATCCTTCTTTCTCTGGTTTTTCCTTGTAGAATGTGTTGTGGACTC
                                                    N  V  L  W  T
CTTCTAAACTGTTAGCACGGCTGGGAAAAGAAATCAACAATGAGAGTTCATACCTTTATTGGGCATACAAG
P  S  K  L  L  A  R  L  G  K  E  I  N  N  E  S  S  Y  L  Y  W  A  Y  K
GTATCCAAAATTTTAACCTTTTTAGTTTTTTAATCATCCTGTGAGGAACTCGGGGATTTAAATTTTCCGCT
TCTTGTGGTGTTTGTAGATGAATATTCCAGTATTCTGCCCAGGGTTAACAGATGGCTCTCTTGGGGATATG
                  M  N  I  P  V  F  C  P  G  L  T  D  G  S  L  G  D  M
CTGTATTTTCACTCTTTTCGTACCTCTGGCCTCATCATCGATGTAGTACAAGGTACTTCTTTTACTCAATA
 L  Y  F  H  S  F  R  T  S  G  L  I  I  D  V  V  Q
AGTCAGTGTGATAAATATTCCTGCTACATCTAGTGCAGGAATATTGTAACTAGTAGTGCATTGTAGCTTTT
CCAATTCAGCAACGGACTTTACTGTAAGTTGATATCTAAAGGTTCAAACGGGAGCTAGGAGAATAGCATAG
GGGCATTCTGATTTAGGTTTGGGGCACTGGGTTAAGAGTTAGAGAATAATAATCTTGTTAGTTGTTTATCA
AACTCTTTGATGGTTAGTCTCTTGGTAATTTGAATTTTATCACAGTGTTTATGGTCTTTGAACCAGTTAAT
GTTTTATGAACAGATATCAGAGCTATGAACGGCGAAGCTGTCCATGCAAATCCTAAAAAGACAGGGATGAT
              D  I  R  A  M  N  G  E  A  V  H  A  N  P  K  K  T  G  M  I
AATCCTTGGAGGGGGCTTGCCAAAGCACCACATATGTAATGCCAATATGATGCGCAATGGTGCAGATTACG
  I  L  G  G  G  L  P  K  H  H  I  C  N  A  N  M  M  R  N  G  A  D  Y
CTGTATTTATAAACACCGGGCAAGAATTTGATGGGAGCGACTCGGGTGCACGCCCTGATGAAGCCGTGTCT
A  V  F  I  N  T  G  Q  E  F  D  G  S  D  S  G  A  R  P  D  E  A  V  S
TGGGGTAAAATTAGGGGTTCTGCTAAAACCGTTAAGGTCTGCTTTTTAATTTCTTCACATCCTAATTTATA
 W  G  K  I  R  G  S  A  K  T  V  K  V  C  F  L  I  S  S  H  P  N  L  Y
TCTCACTCAGTGGTTTTGAGTACATATTTAATATTGGATCATTCTTGCAGGTATACTGTGATGCTACCATA
  L  T  Q  W  F
GCCTTCCCATTGTTGGTTGCAGAAACATTTGCCACAAAGAGAGACCAAACCTGTGAGTCTAAGACTTAAGA
ACTGACTGGTCGTTTTGGCCATGGATTCTTAAAGATCGTTGCTTTTTGATTTTACACTGGAGTGACCATAT
AACACTCCACATTGATGTGGCTGTGACGCGAATTGTCTTCTTGCGAATTGTACTTTAGTTTCTCTCAACCT
AAAATGATTTGCAGATTGTGTTTTCGTTTAAAACACAAGAGTCTTGTAGTCAATAATCCTTTGCCTTATAA
AATTATTCAGTTCCAACAACACATTGTGATTCTGTGACAAGTCTCCCGTTGCCTATGTTCACTTCTCTGCG
```

Figure 2B

MEDDRVFSSVHSTVFKESESLEGKCDKIEGYDFNQGVDYPKLMRSMLTTGFQASNLGEAIDVVNQMFEFVLKLDWRLADETTV
AEDCSEEEKNPSFRESVKCKIFLGFTSNLVSSGVRDTIRYLVQHHMVDVIVTTTGGVEEDLIKCLAPTFKGDFSLPGAYLRSK
GLNRIGNLLVPNDNYCKFEDWIIPIFDEMLKEQKEENVLWTPSKLLARLGKEINNESSYLYWAYKMNIPVFCPGLTDGSLGDM
LYFHSFRTSGLIIDVVQDIRAMNGEAVHANPKKTGMIILGGGLPKHHICNANMMRNGADYAVFINTGQEFDGSDSGARPDEAV
SWGKIRGSAKTVKVCFLISSHPNLYLTQWF

Figure 2C

GGTGGTGTTGAGGAAGATCTCATAAAATGCCTTGCACCTACATTTAAAGGTGATTTCTCTCTACCTGGAGCTTATTTAAG
GTCAAAGGGATTGAACCGAATTGGGAATTTGCTGGTTCCTAATGATAACTACTGCAAGTTTGAGGATTGGATCATTCCCA
TCTTTGACGAGATGTTGAAGGAACAGAAAGAAGAGAATGTGTTGTGGACTCCTTCTAAACTGTTAGCACGGCTGGAAAA
GAAATCAACAATGAGAGTTCATACCTTTATTGGGCATACAAGATGAATATTCCAGTATTCTGCCCAGGGTTAACAGATGG
CTCTCTTAGGGATATGCTGTATTTTCACTCTTTTCGTACCTCTGGCCTCATCATCGATGTAGTACAAGATATCAGAGCTA
TGAACGGCGAAGCTGTCCATGCAAATCCTAAAAAGACAGGGATGATAATCCTTGGAGGGGGCTTGCCAAAGCACCACATA
TGTAATGCCAATATGATGCGCAATGGTGCAGATTACGCTGTATTTATAAACACCGGGCAAGAATTTGATGGGAGCGACTC
GGGTGCACGCCCTGATGAAGC

Figure 2D

GGVEEDLIKCLAPTFKGDFSLPGAYLRSKGLNRIGNLLVPNDNYCKFEDWIIPIFDEMLKEQKEENVLWTPSKLLARLGKEIN
NESSYLYWAYKMNIPVFCPGLTDGSLRDMLYFHSFRTSGLIIDVVQDIRAMNGEAVHANPKKTGMIILGGGLPKHHICNANMM
RNGADYAVFINTGQEFDGSDSGARPDE

Figure 3

Multiple DHS Sequence Alignments of Human, Arabidopsis, Tomato, Yeast, Neurospora(Fungi), and Methanococcus(Archaeobacteria)

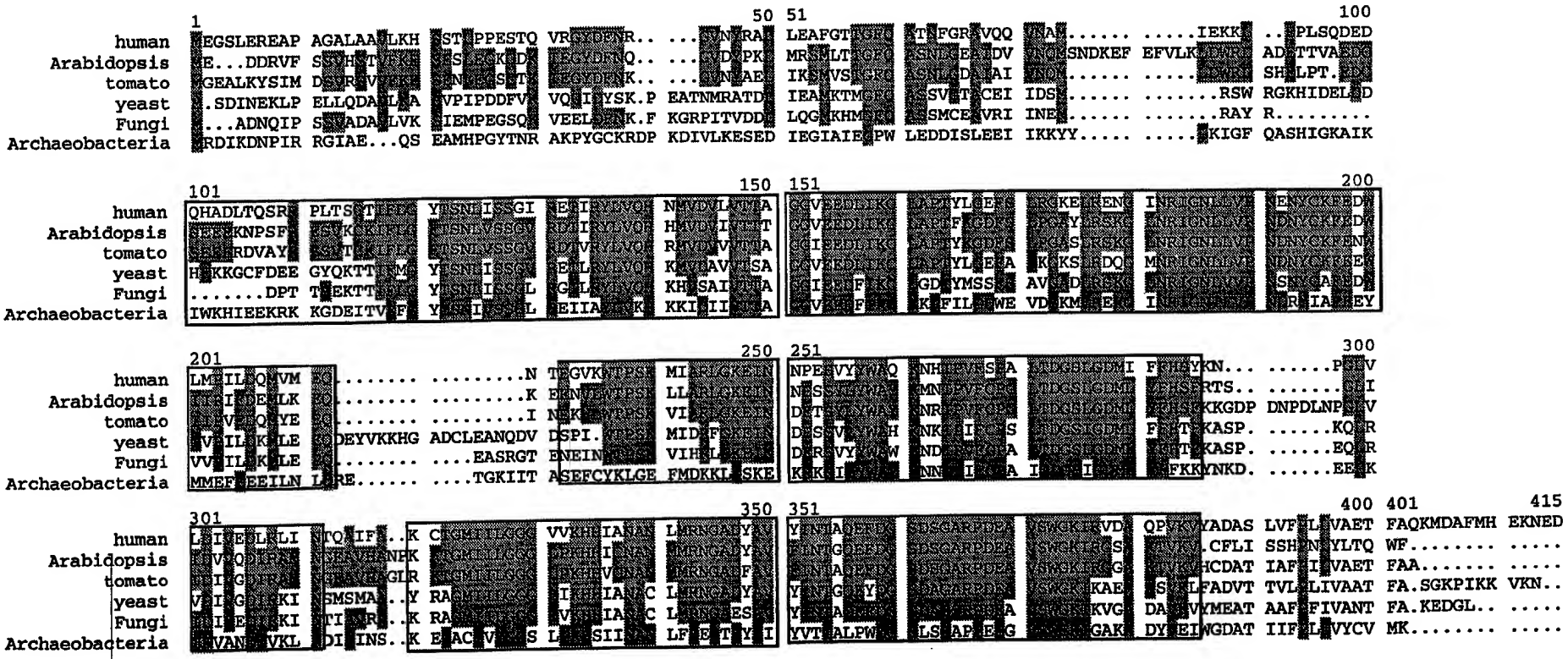


Figure 4

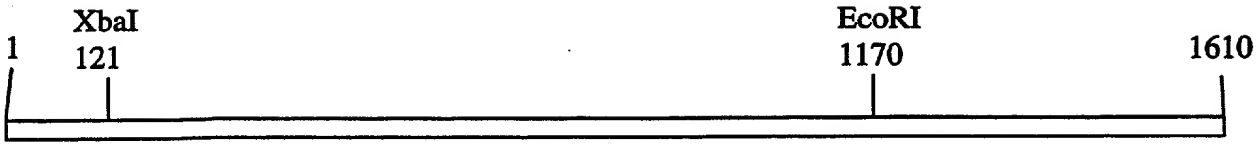


Figure 5

Southern Analysis of DHS

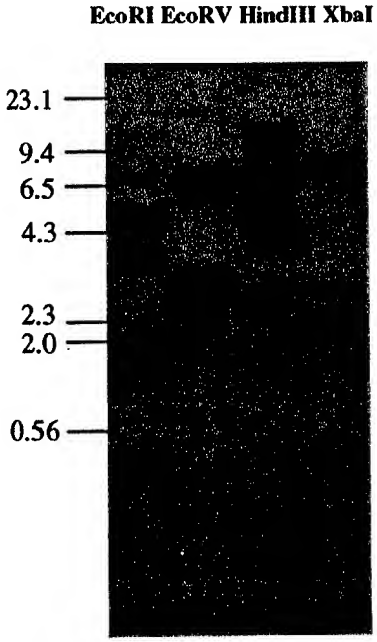


Figure 6

Northern Analysis of DHS on Tomato Flowers

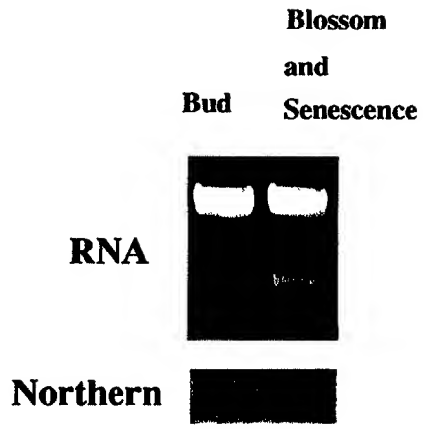


Figure 7

Northern Analysis of DHS on Developmental Stages of Tomato Fruit

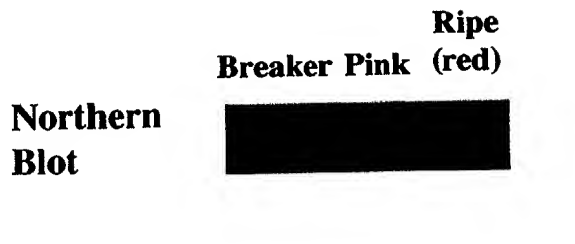


Figure 8

Northern Analysis of DHS - 2M Sorbitol treated Tomato Leaves

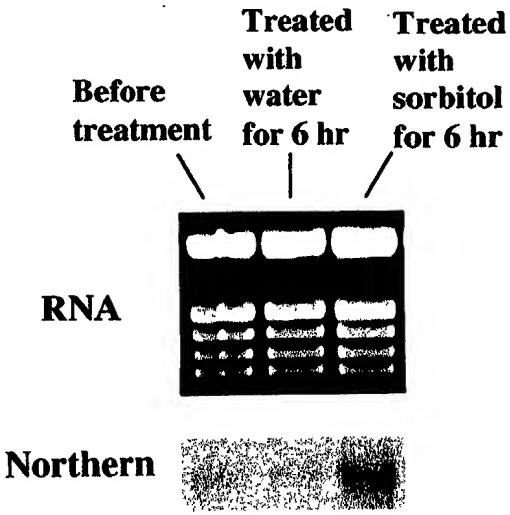
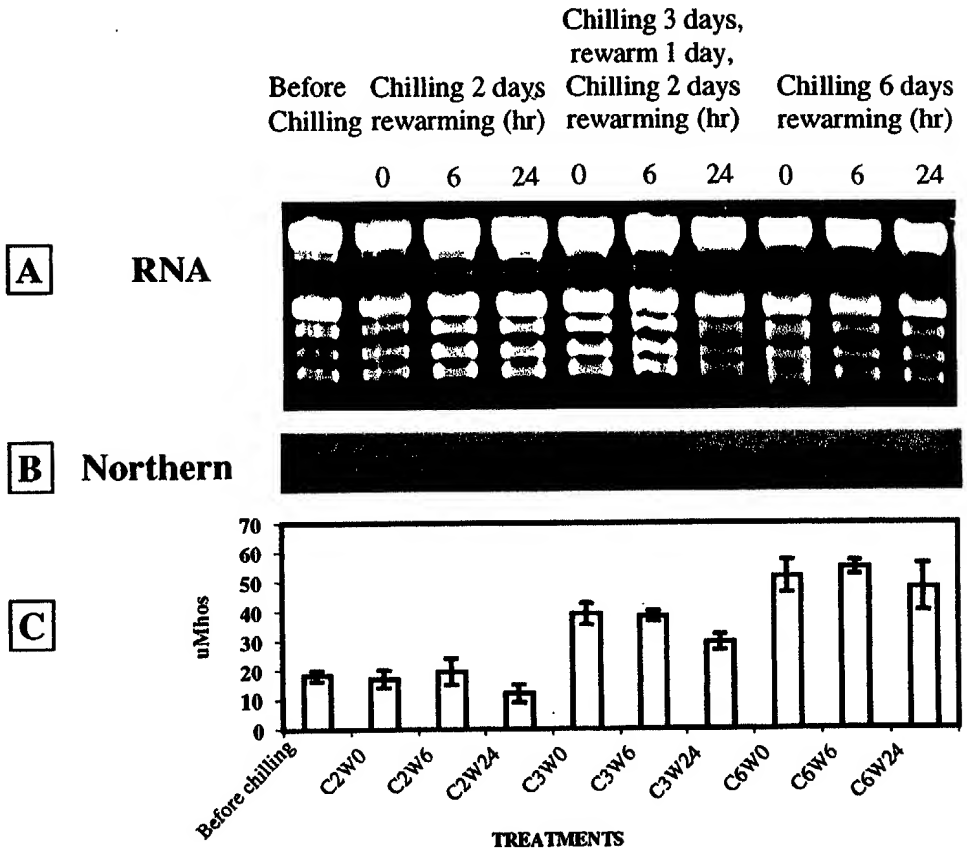


Figure 9

Northern Analysis of DHS Tomato Leaf Chilling Effects



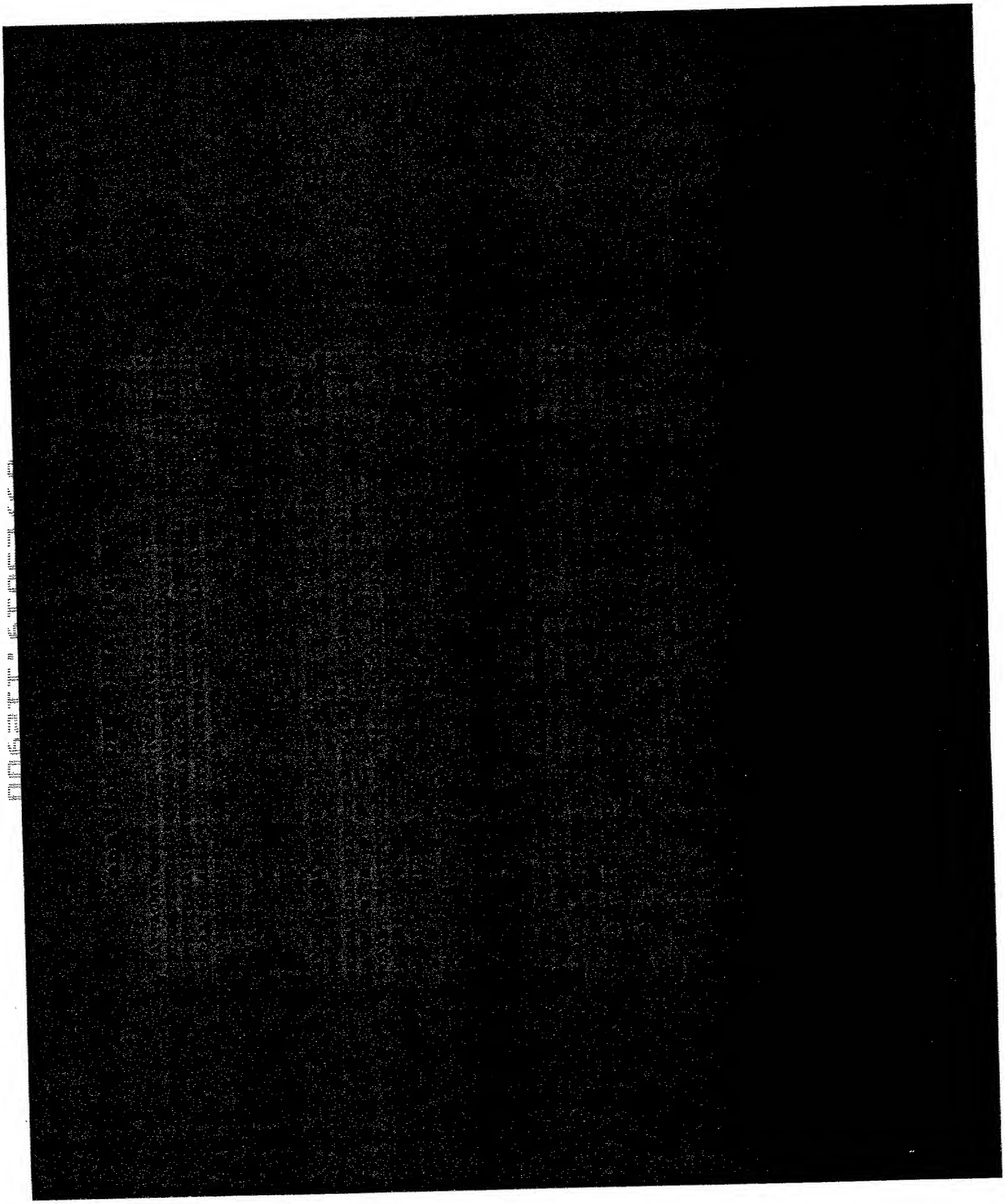


Figure 10

Northern Analysis of WT AT Aging Leaves

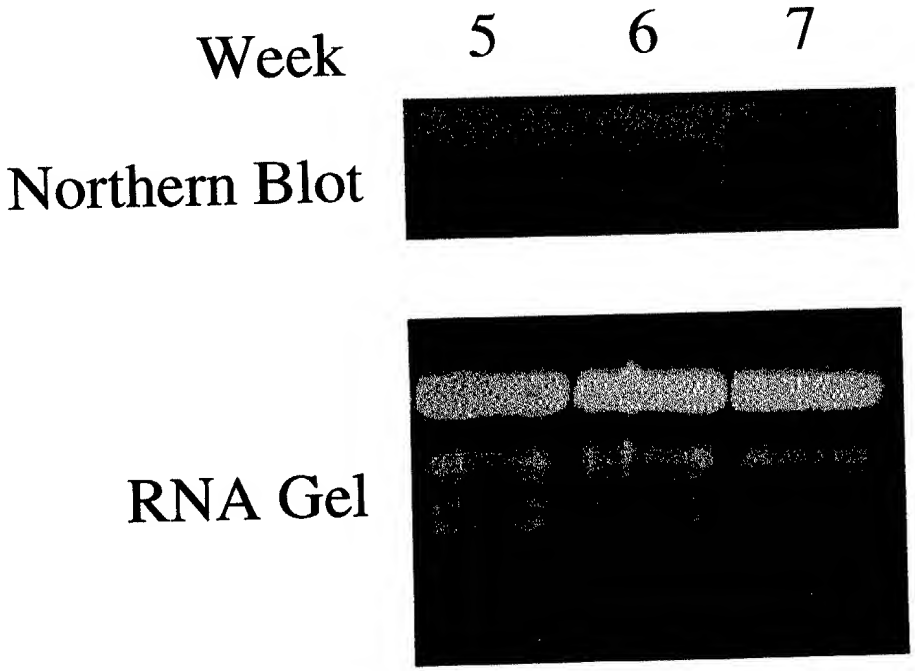


Figure 11

Northern Analysis of Canation Petal (*In Situ*)DHS

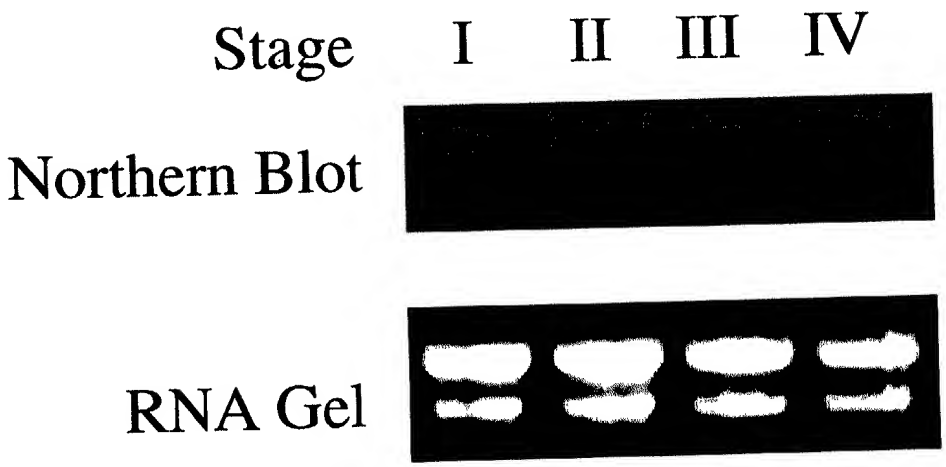


Figure 12

Tomato eif5A

Figure 13

```
AAAGAATCCTAGAGAGAGAAAGGGAATCCTAGAGAGAGAAGCATGTCGGACGAAGAACAC
                                              M  S  D  E  E  H
CATTTTGAGTCAAAGGCAGATGCTGGTGCCTCAAAAACTTTCCCACAGCAAGCTGGAACC
H  F  E  S  K  A  D  A  G  A  S  K  T  F  P  Q  Q  A  G  T
ATCCGTAAGAATGGTTACATCGTTATCAAAGGCCGTCCCTGCAAGGTTGTTGAGGTCTCC
I  R  K  N  G  Y  I  V  I  K  G  R  P  C  K  V  V  E  V  S
ACTTCAAAAACTGGAAAACACGGACATGCTAAATGTCACTTTGTGGCAATTGACATTTTC
T  S  K  T  G  K  H  G  H  A  K  C  H  F  V  A  I  D  I  F
AATGGAAAGAAACTGGAAGATATCGTTCCGTCCTCCCACAATTGTGATGTGCCACATGTT
N  G  K  K  L  E  D  I  V  P  S  S  H  N  C  D  V  P  H  V
AACCGTACCGACTATCAGCTGATTGATATCTCTGAAGATGGTTTTGTCTCACTTCTTACT
N  R  T  D  Y  Q  L  I  D  I  S  E  D  G  F  V  S  L  L  T
GAAAGTGGAAACACCAAGGATGACCTCAGGCTTCCCACCGATGAAAATCTGCTGAAGCAG
E  S  G  N  T  K  D  D  L  R  L  P  T  D  E  N  L  L  K  Q
GTTAAAGATGGGTTCCAGGAAGGAAAGGATCTTGTGGTGTCTGTTATGTCTGCGATGGGC
V  K  D  G  F  Q  E  G  K  D  L  V  V  S  V  M  S  A  M  G
GAAGAGCAGATTAACGCCGTTAAGGATGTTGGTACCAAGAATTAGTTATGTCATGGCAGC
E  E  Q  I  N  A  V  K  D  V  G  T  K  N
ATAATCACTGCCAAAGCTTTAAGACATTATCATATCCTAATGTGGTACTTTGATATCACT
AGATTATAAACTGTGTTATTTGCACTGTTCAAAACAAAAGAAAGAAAACTGCTGTTATGG
CTAGAGAAAGTATTGGCTTTGAGCTTTTGACAGCACAGTTGAACTATGTGAAAATTCTAC
TTTTTTTTTTTTGGGTAAAATACTGCTCGTTTAATGTTTTGCAAAAAAAAAAAAAAAAA
```

764 bps, not including Poly(A) tail; 160 amino acids

Figure 13

Carnation - F5A

CTCTTTTACATCAATCGAAAAAAAATTAGGGTTCTTATTTTAGAGTGAGA

GGCGAAAAATCGAACG**ATG**TCGGACGACGATCACCATTTCGAGTCATCGG
M S D D D H H F E S S A
CCGACGCCGGAGCATCCAAGACTTACCCTCAACAAGCTGGTACAATCCGC
D A G A S K T Y P Q Q A G T I R
AAGAGCGGTCACATCGTCATCAAAAATCGcCCtTGCAAGGtGGTTGAGGT
K S G H I V I K N R P C K V V E V
TTCTACCTCCAAGACTGGCAAGCACGGTCATGCCAAATGTCACTTTGTTG
S T S K T G K H G H A K C H F V A
CCATTGACATTTTCAACGGCAAGAAGCTGGAAGATATTGTCCCCTCATCC
I D I F N G K K L E D I V P S S
CACAATTGTGATGTTCCACATGTCAACCGTGTCGACTACCAGCTGCTTGA
H N C D V P H V N R V D Y Q L L D
TATCACTGAAGATGGCTTTGTTAGTCTGCTGACTGACAGTGGTGACACCA
I T E D G F V S L L T D S G D T K
AGGATGATCTGAAGCTTCCTGCTGATGAGGCCCTTGTGAAGCAGATGAAG
D D L K L P A D E A L V K Q M K
GAGGGATTTGAGGCGGGGAAAGACTTGATTCTGTCAGTCATGTGTGCAAT
E G F E A G K D L I L S V M C A M
GGGAGAAGAGCAGATCTGCGCCGTCAAGGACGTTAGTGGTGGCAAG**TAG**A
G E E Q I C A V K D V S G G K
AGCTTTTGATGAATCCAATACTACGCGGTGCAGTTGAAGCAATAGTAATC
TCGAGAACATTCTGAACCTTATATGTTGAATTGATGGTGCTTAGTTTGTT
TTGGAAATCTCTTTGCAATTAAGTTGTACCAAATCAATGGATGTAATGTC
TTGAATTTGTTTTATTTTTGTTTTGATGTTTGCTGtGATTGCATTATGCA
TTGTTATGAGTTATGACCTGTTATAACACAAGGTTTTGGTAAAAAAAAAA
AAAAAAAAAAAA

790 bps, 160 amino acids

Figure 14

Arabidopsis F5A

CTGTTACCAAAAAATCTGTACCGCAAAATCCTCGTCGAAGCTCGCTGCTGCAACC**ATG**TC
M S

CGACGAGGAGCATCACTTTGAGTCCAGTGACGCCGGAGCGTCCAAAACCTACCCTCAACA
D E E H H F E S S D A G A S K T Y P Q Q
AGCTGGAACCATCCGTAAGAATGGTTACATCGTCATC**AAAAATCGTCCCTGCAAGGT**TGT
A G T I R K N G Y I V I K N R P C K V V
TGAGGTTTCAACCTCGAAGACTGGCAAGCATGGTCATGCTAAATGTCATTTTGTAGCTAT
E V S T S K T G K H G H A K C H F V A I
TGATATCTTCACCAGCAAGAAACTCGAAGATATTGTTCCTTCTTCCCACAATTGTGATGT
D I F T S K K L E D I V P S S H N C D V
TCCTCATGTCAACCGTACTGATTATCAGCTGATTGACATTTCTGAAGATGGATATGTCAG
P H V N R T D Y Q L I D I S E D G Y V S
TTTGTTGACTGATAACGGTAGTACCAAGGATGACCTTAAGCTCCCTAATGATGACACTCT
L L T D N G S T K D D L K L P N D D T L
GCTCCAACAGATCAAGAGT**GGGTTTGATGATGGAAAAGA**TCTAGTGGTGAGTGTAATGTC
L Q Q I K S G F D D G K D L V V S V M S
AGCTATGGGAGAGGAACAGATCAATGCTCTTAAGGACATCGGTCCCAAG**TGA**GACTAACA
A M G E E Q I N A L K D I G P K
AAGCCTCCCCTTTGTTATGAGATTCTTCTTCTTCTGTAGGCTTCCATTACTCGTCGGAGA
TTATCTTGTTTTTGGGTTACTCCTATTTTGGATATTTAAACTTTTGTTAATAATGCCATC
TTCTTCAACCTTTTCCTTCTAGATGGTTTTTATACTTCTTCT

754 bps, not including Poly(A) tail; 158 amino acids

Figure 15

Northern Analysis of WT AT DHS and F5A Aging Leaves

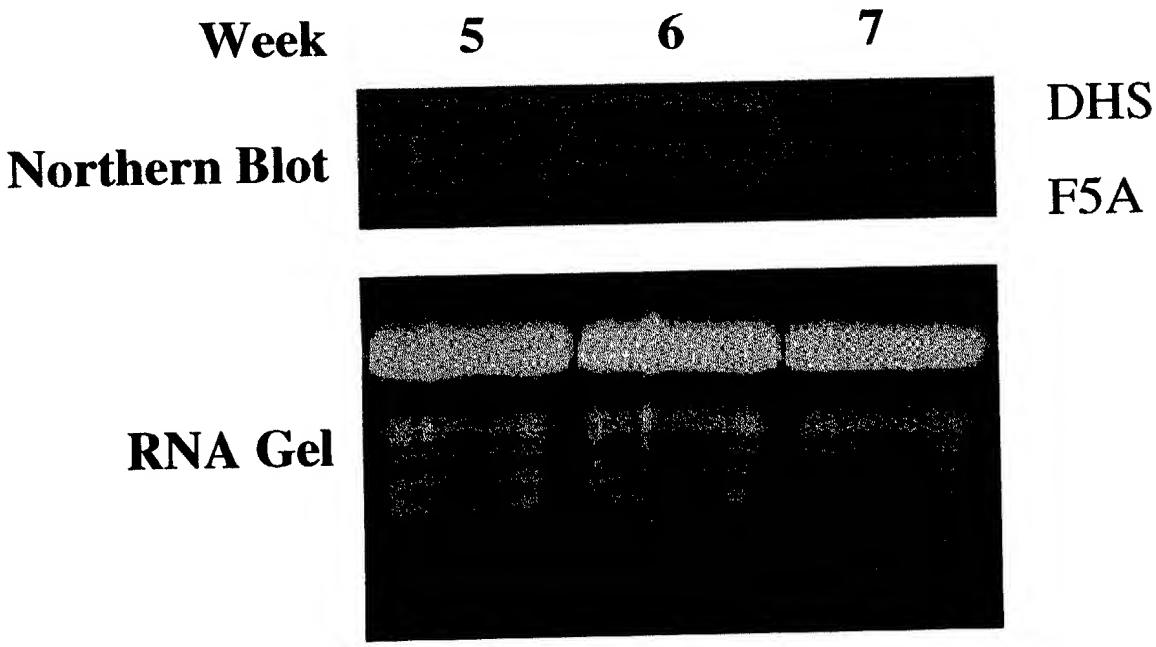


Figure 16

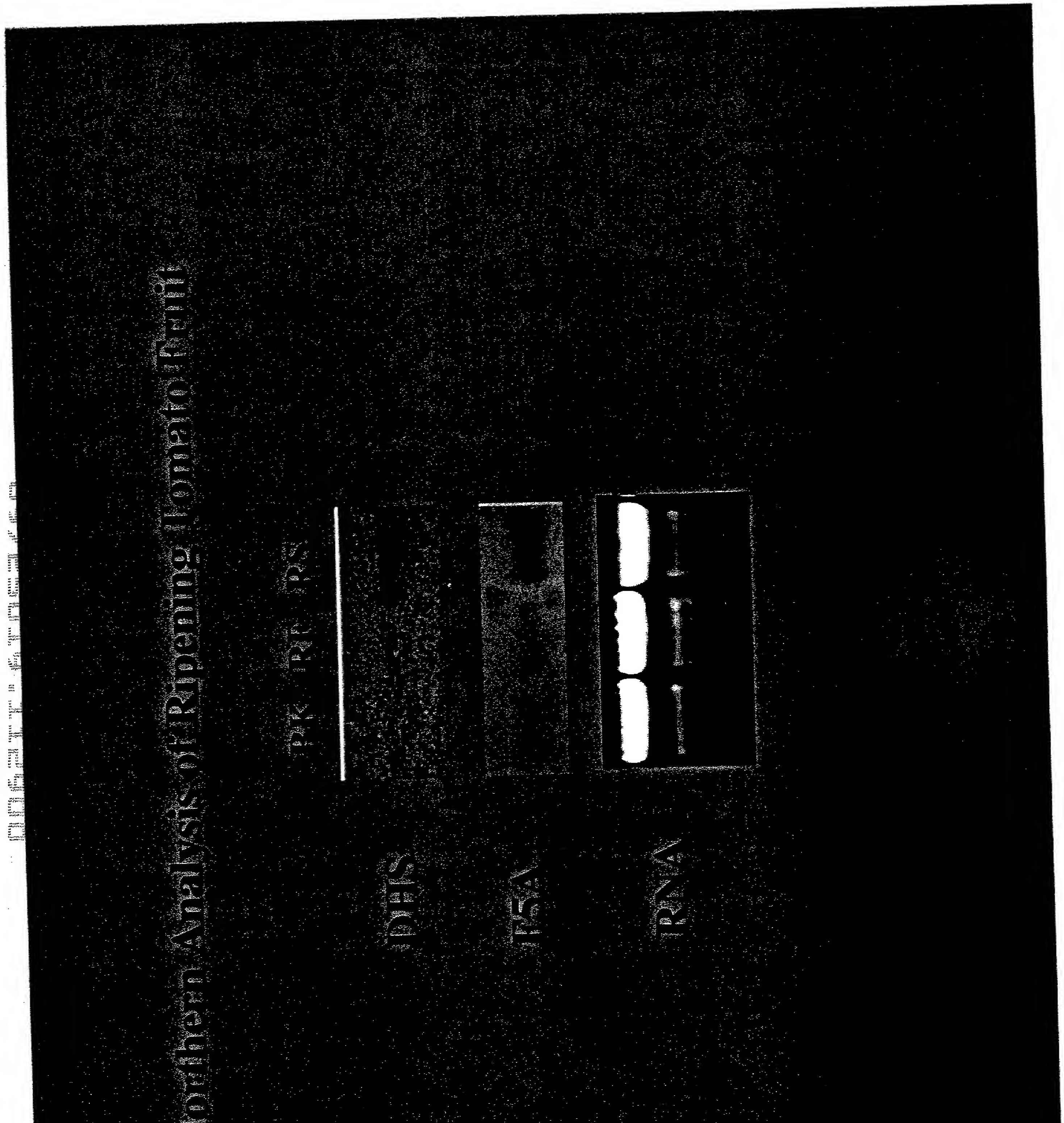


Figure 17

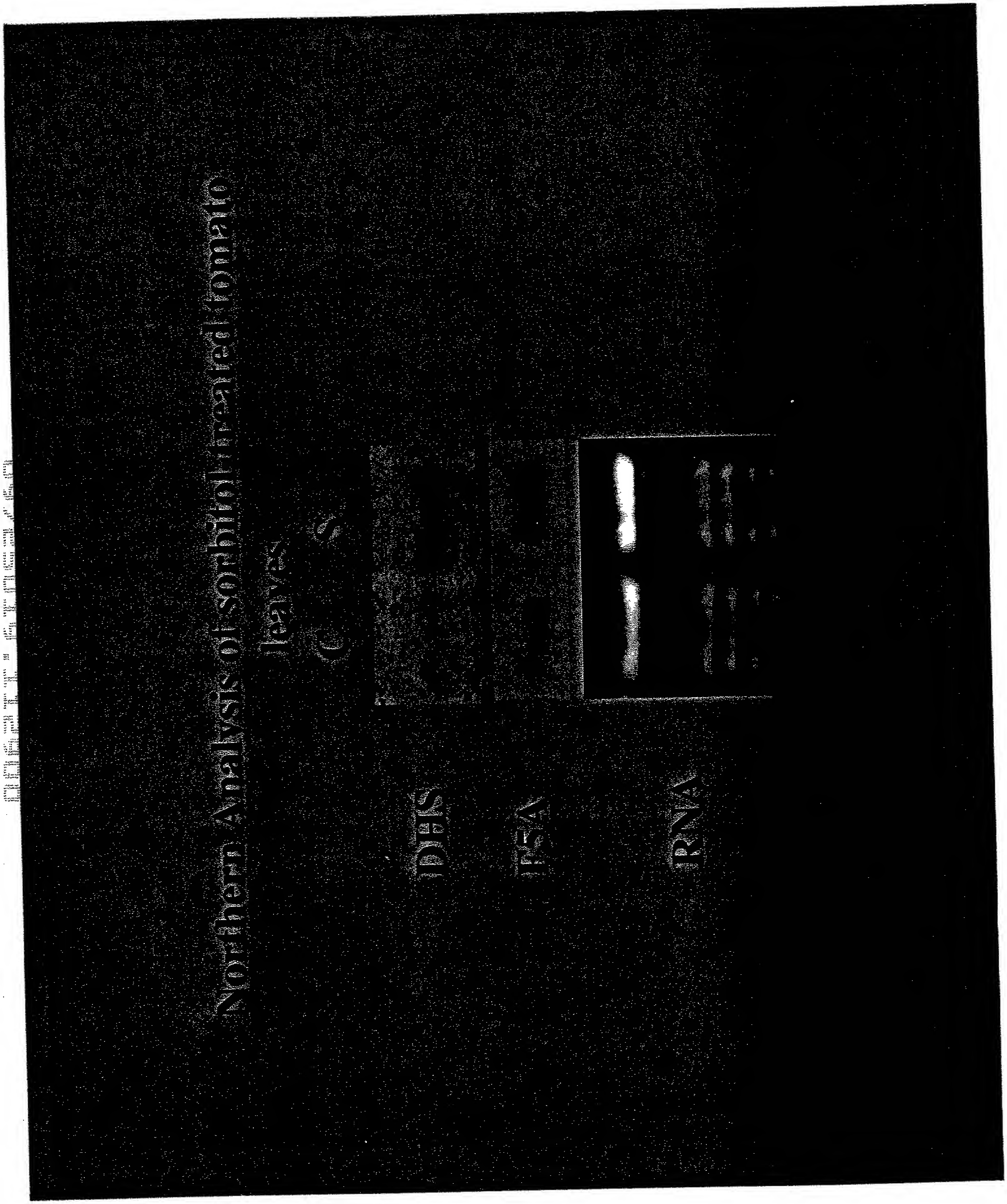

Northern Analysis of sorbitol-treated tomato leaves
C
S
DHS
RNA

Figure 18

Northern Analysis of Homeotic Flowers
Open &
Flower consume
Buds flowers
DFR
HFA
PCA

Figure 19

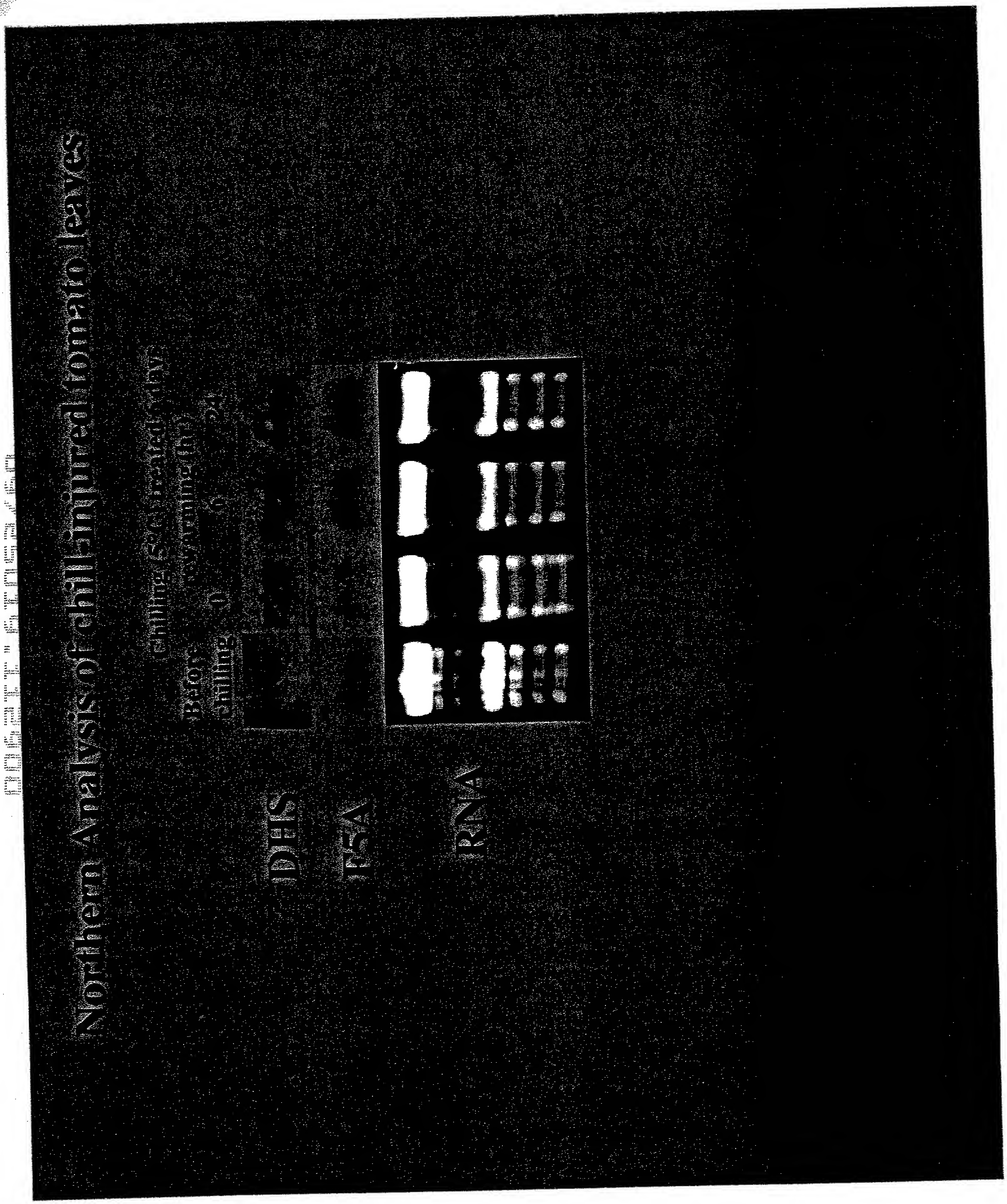

Northern Analysis of chill-injured tomato leaves
Before
Chilling
0
6
24
DHS
F5A
RNA

Figure 20

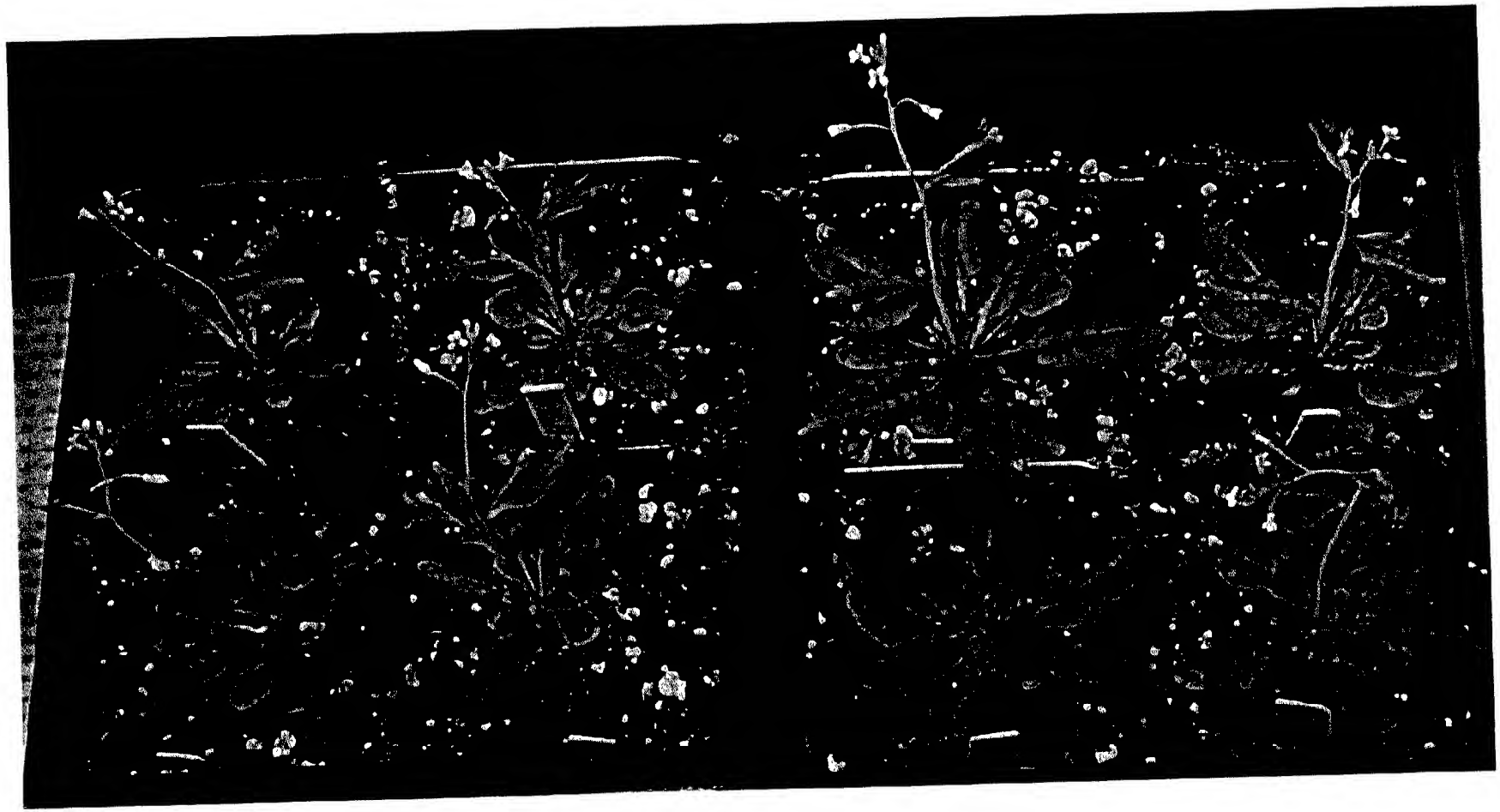
3.1 Weeks

Wild-Type

α - 3'DHS # 3

Figure 21

4.6 Weeks



Wild-Type

α - 3'DHS # 3

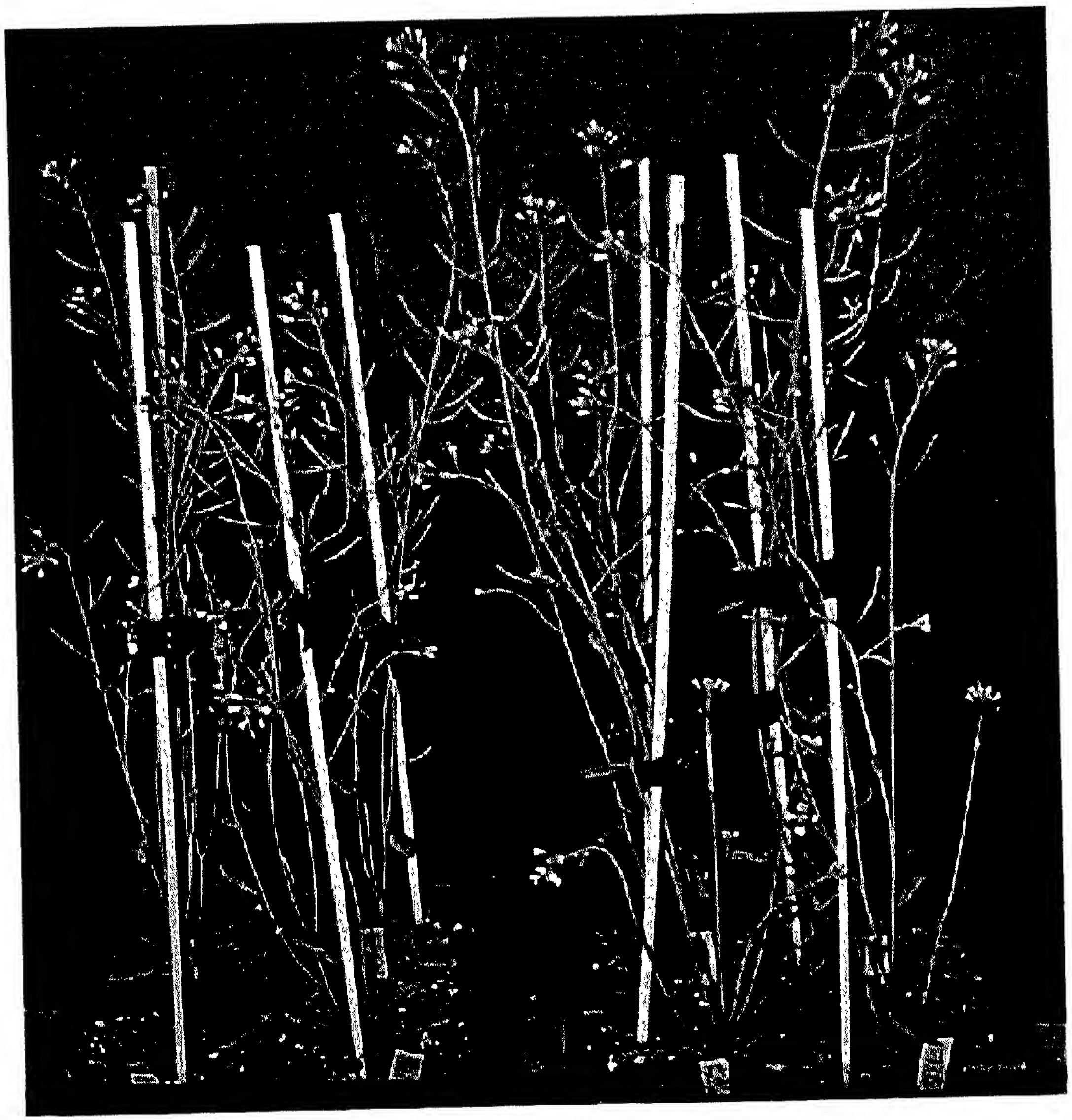
Figure 22

5.6 Weeks

Wild-Type α - 3'DHS # 7

Figure 23

6.1 Weeks



Wild-Type α - 3'DHS # 7

Figure 24

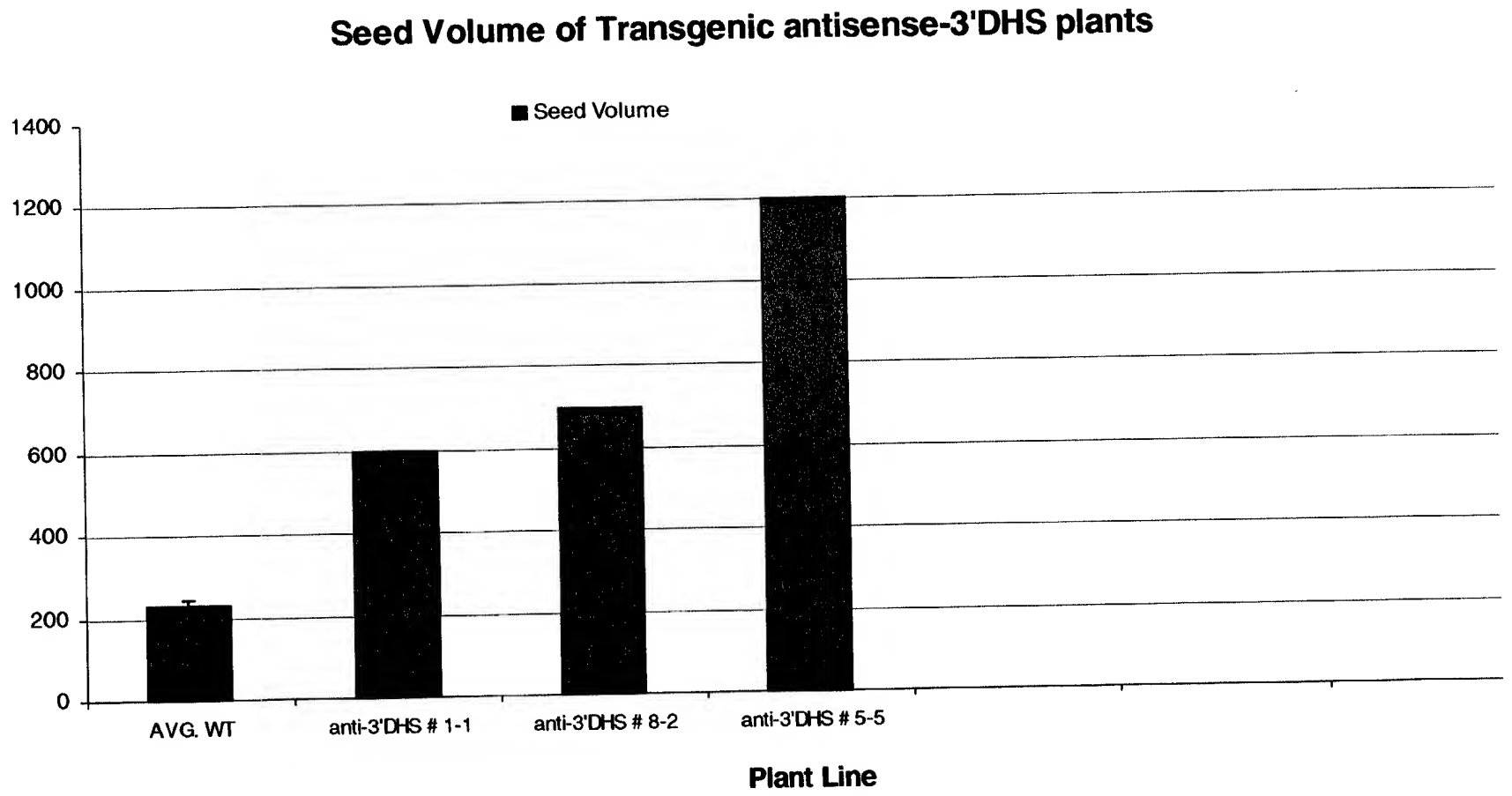


Figure 25

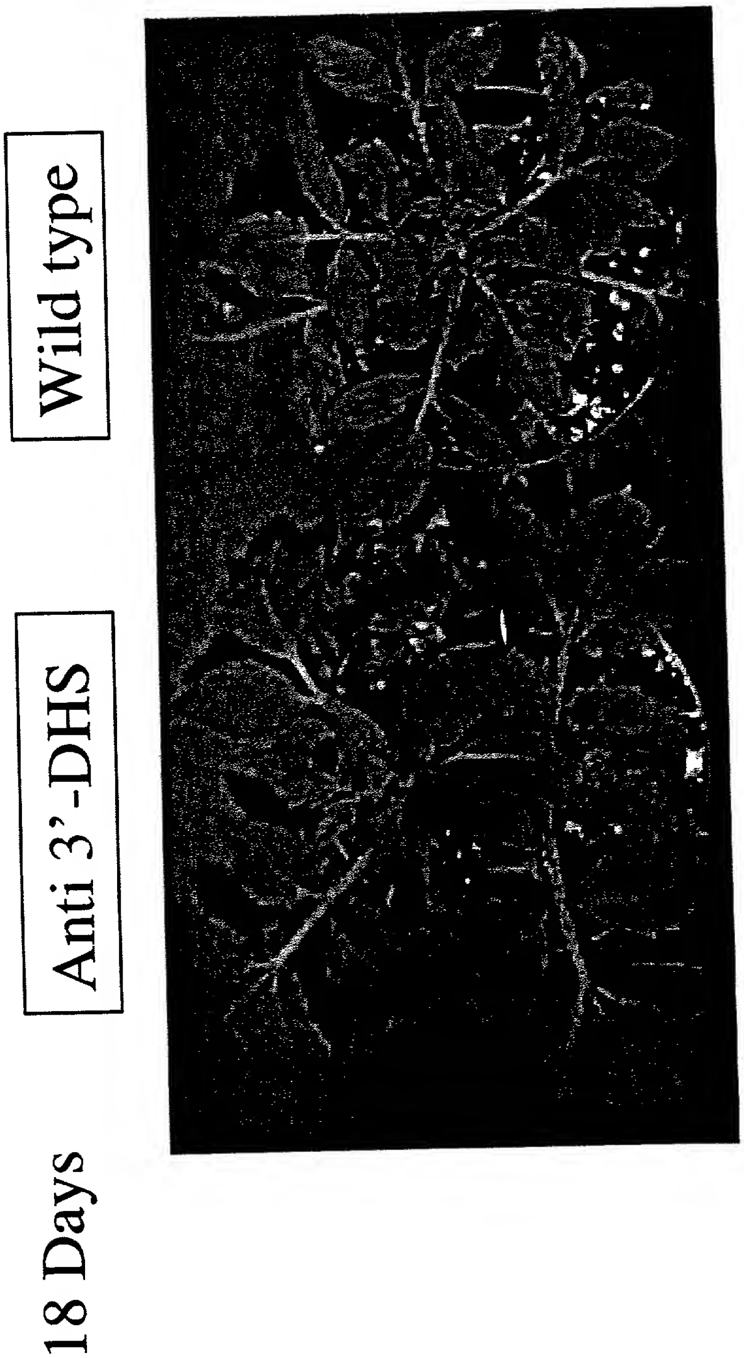


Figure 26

32 Days

Anti 3'-DHS

Wild type

Figure 27

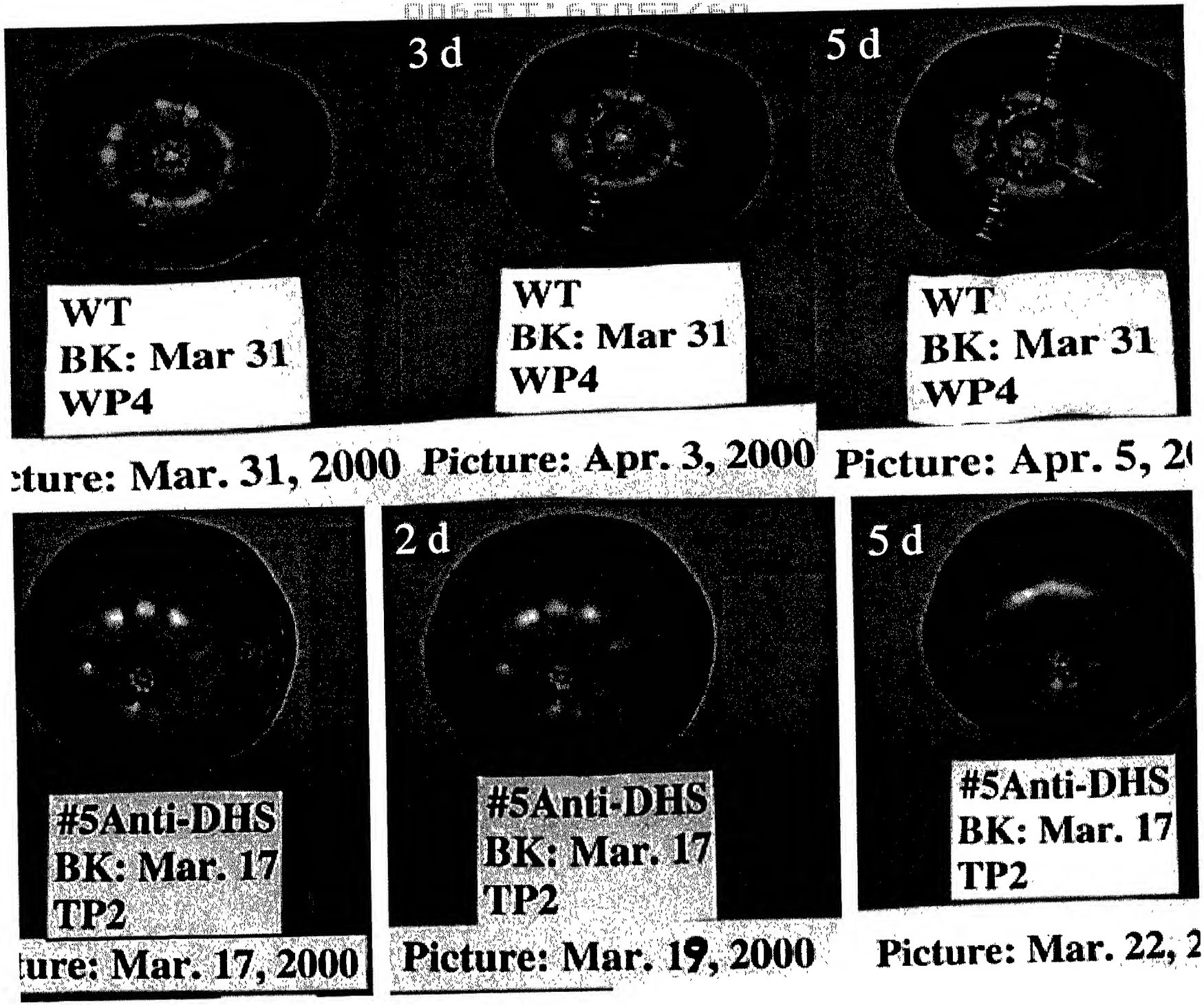

3 d
5 d
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
ture: Mar. 31, 2000
Picture: Apr. 3, 2000
Picture: Apr. 5, 2
2 d
5 d
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
ture: Mar. 17, 2000
Picture: Mar. 19, 2000
Picture: Mar. 22, 2

Figure 28

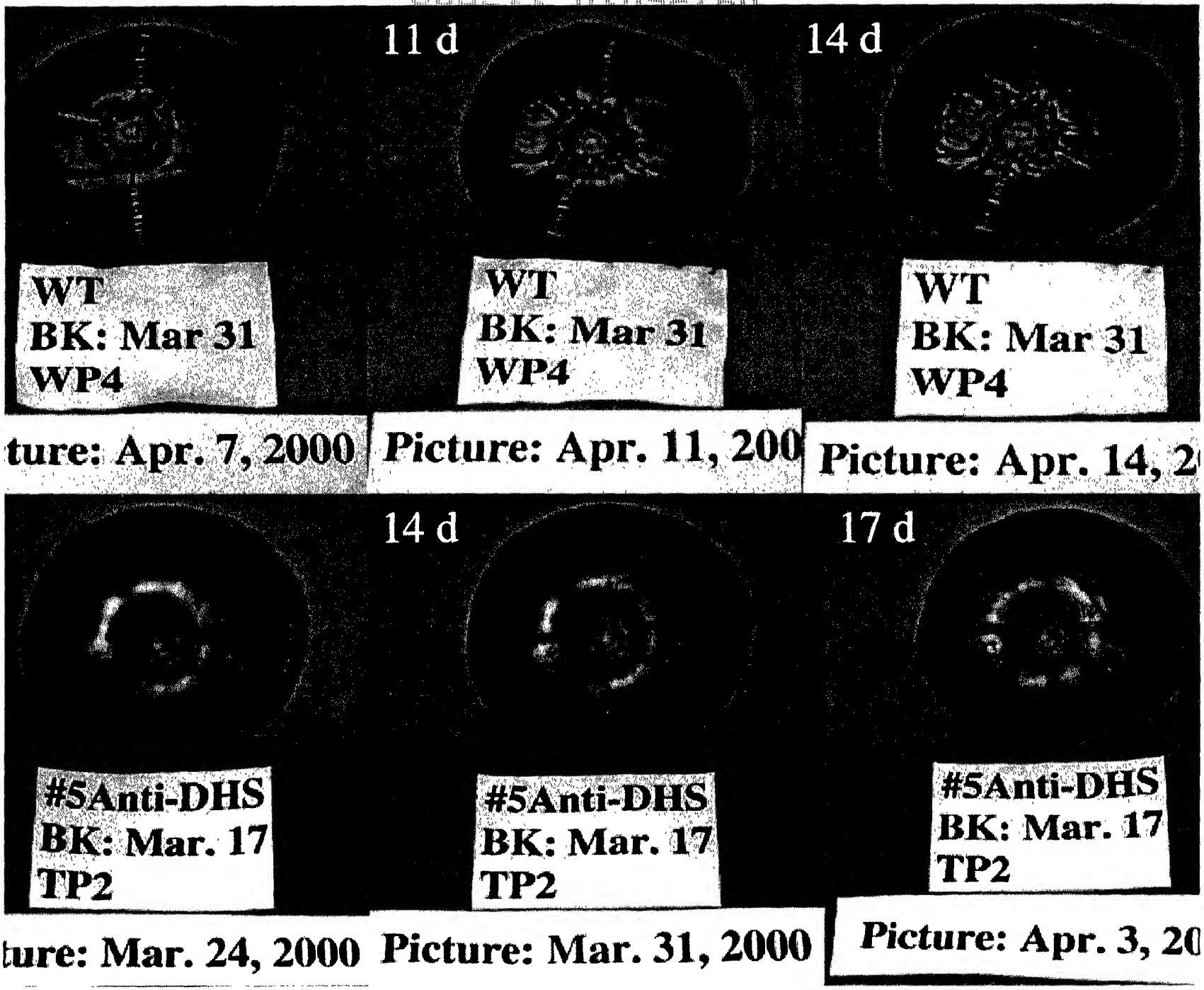

11 d
14 d
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
ture: Apr. 7, 2000
Picture: Apr. 11, 200
Picture: Apr. 14, 2
14 d
17 d
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
ture: Mar. 24, 2000
Picture: Mar. 31, 2000
Picture: Apr. 3, 20

Figure 29

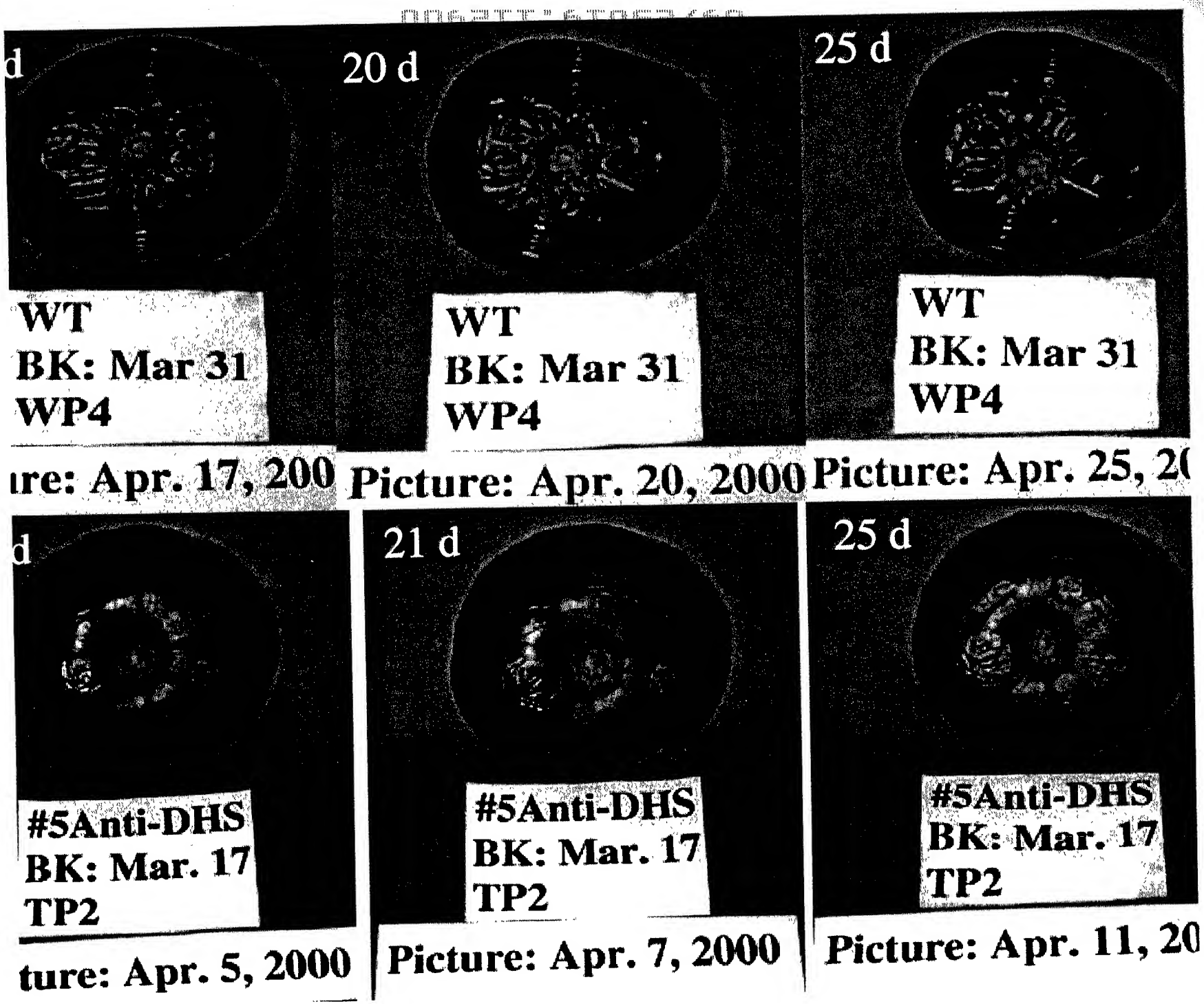

d
WT
BK: Mar 31
WP4
ıre: Apr. 17, 200
20 d
WT
BK: Mar 31
WP4
Picture: Apr. 20, 2000
25 d
WT
BK: Mar 31
WP4
Picture: Apr. 25, 2(
d
#5Anti-DHS
BK: Mar. 17
TP2
ture: Apr. 5, 2000
21 d
#5Anti-DHS
BK: Mar. 17
TP2
Picture: Apr. 7, 2000
25 d
#5Anti-DHS
BK: Mar. 17
TP2
Picture: Apr. 11, 20

Figure 30

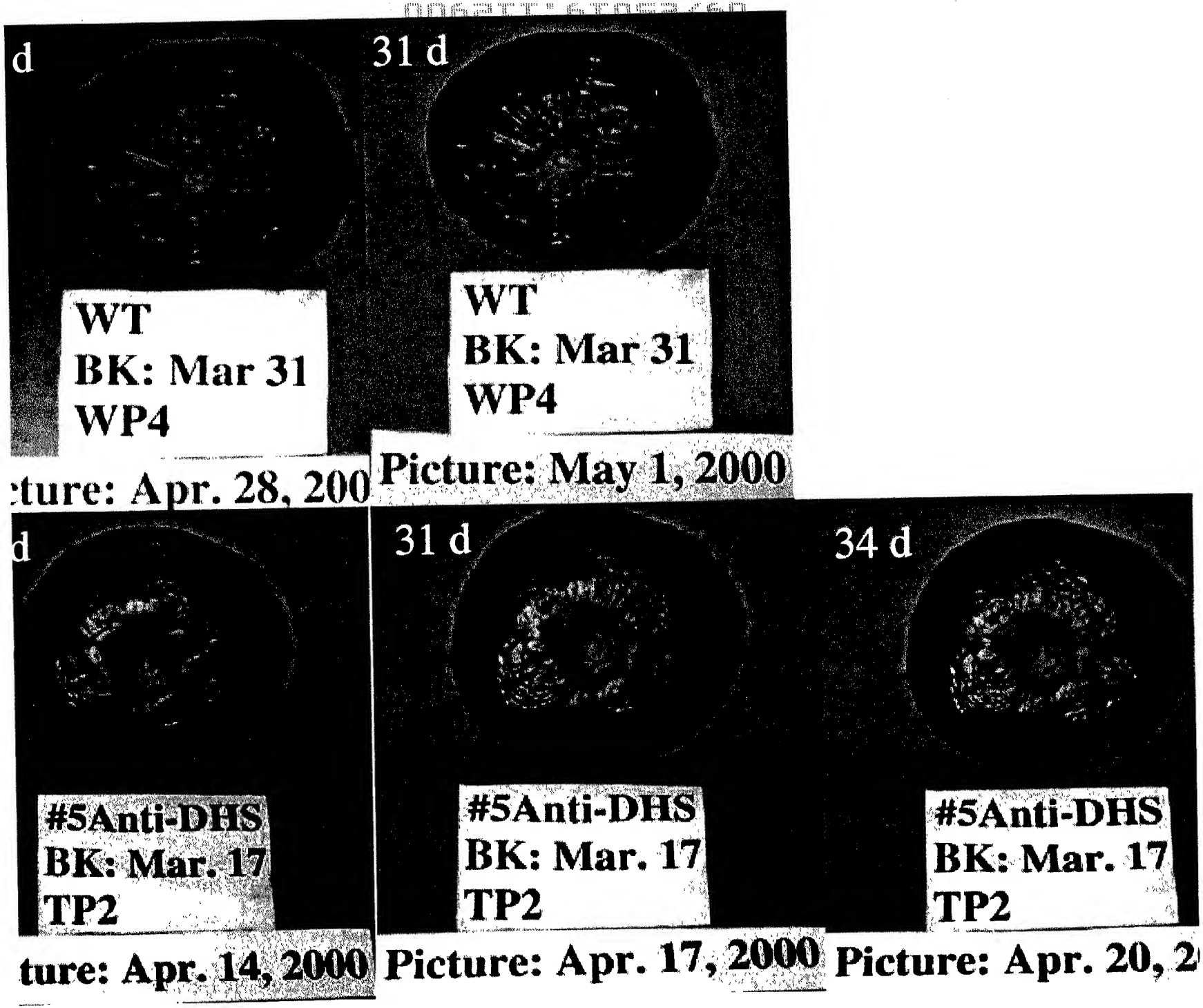

d
WT
BK: Mar 31
WP4
:ture: Apr. 28, 200
31 d
WT
BK: Mar 31
WP4
Picture: May 1, 2000
d
#5Anti-DHS
BK: Mar. 17
TP2
ture: Apr. 14, 2000
31 d
#5Anti-DHS
BK: Mar. 17
TP2
Picture: Apr. 17, 2000
34 d
#5Anti-DHS
BK: Mar. 17
TP2
Picture: Apr. 20, 2

Figure 31

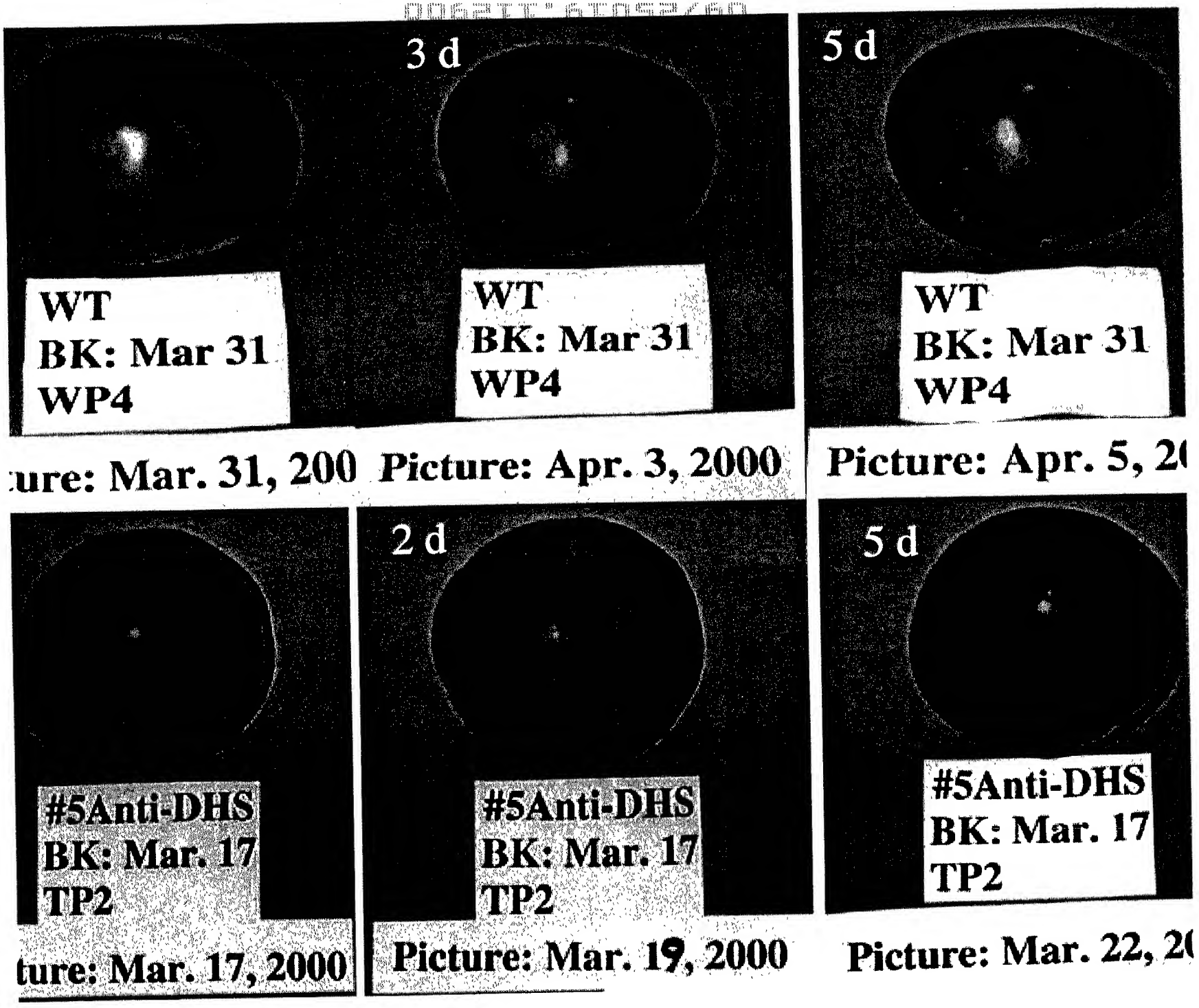

3 d
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
5 d
WT
BK: Mar 31
WP4
ure: Mar. 31, 200
Picture: Apr. 3, 2000
Picture: Apr. 5, 2(
#5Anti-DHS
BK: Mar. 17
TP2
2 d
#5Anti-DHS
BK: Mar. 17
TP2
5 d
#5Anti-DHS
BK: Mar. 17
TP2
ture: Mar. 17, 2000
Picture: Mar. 19, 2000
Picture: Mar. 22, 2(

Figure 32

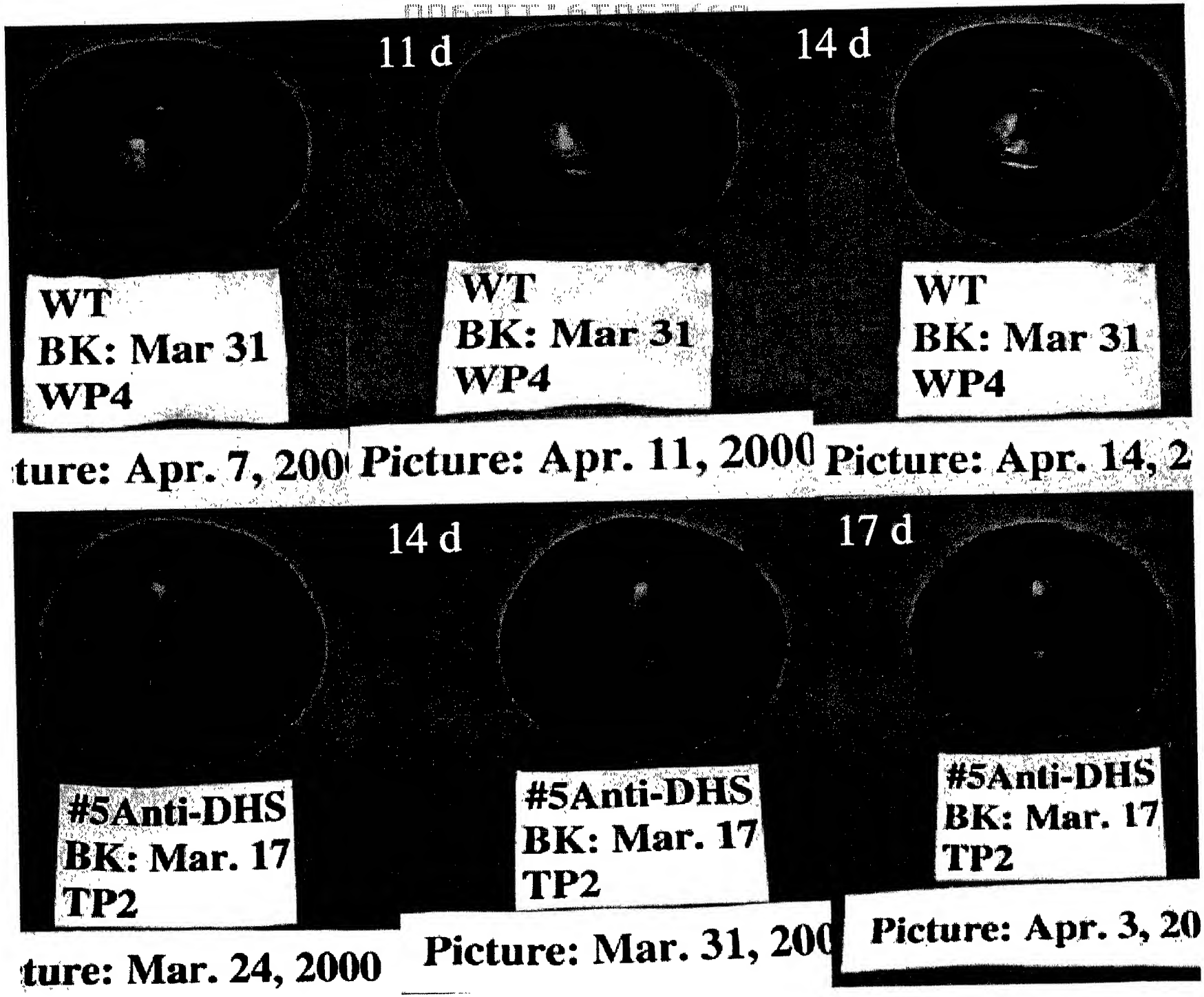

11 d
14 d
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
ture: Apr. 7, 200
Picture: Apr. 11, 2000
Picture: Apr. 14, 2
14 d
17 d
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
ture: Mar. 24, 2000
Picture: Mar. 31, 200
Picture: Apr. 3, 20

Figure 33

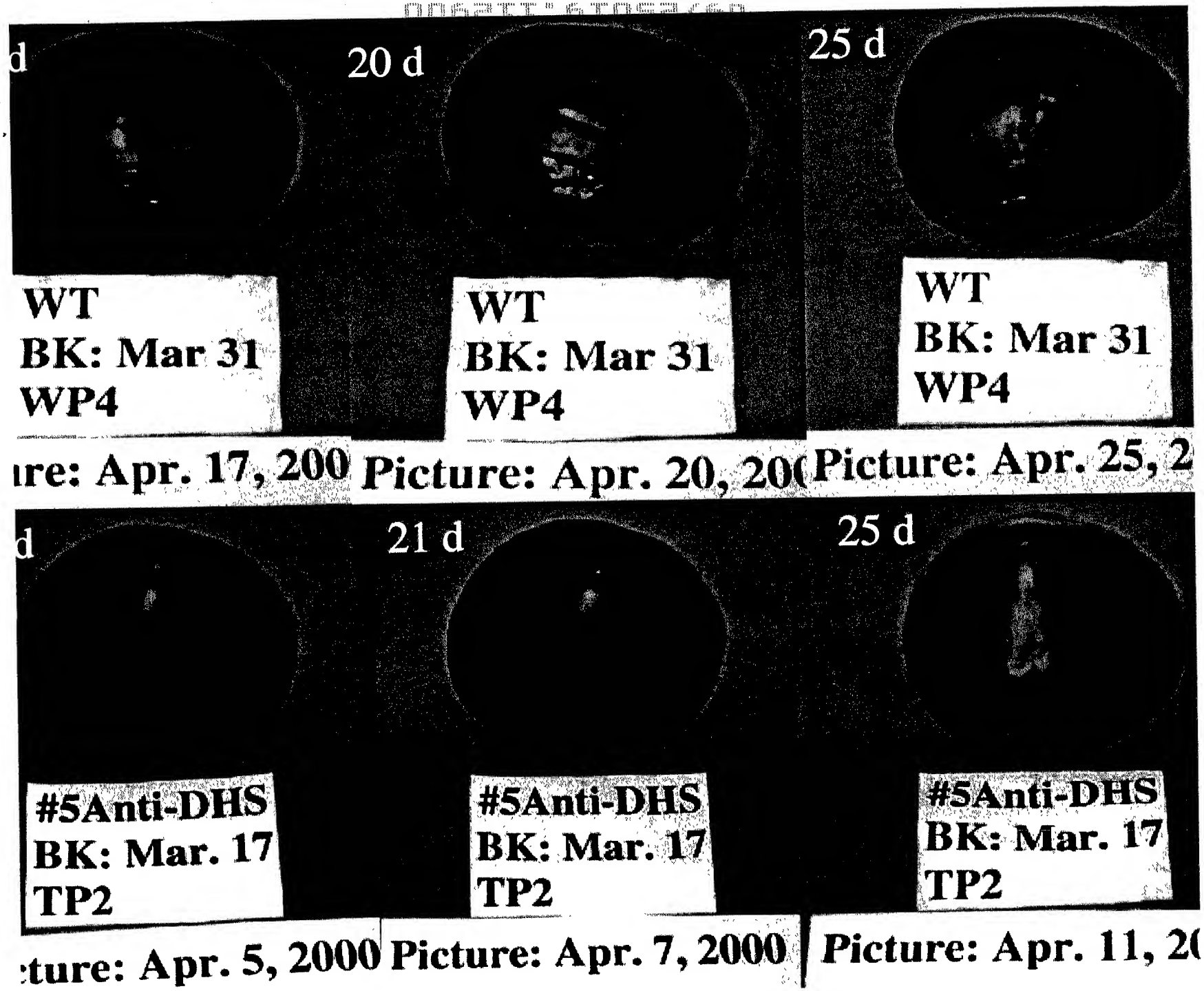

d
20 d
25 d
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
WT
BK: Mar 31
WP4
ıre: Apr. 17, 200
Picture: Apr. 20, 20(
Picture: Apr. 25, 2
d
21 d
25 d
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
#5Anti-DHS
BK: Mar. 17
TP2
:ture: Apr. 5, 2000
Picture: Apr. 7, 2000
Picture: Apr. 11, 2(

Figure 34

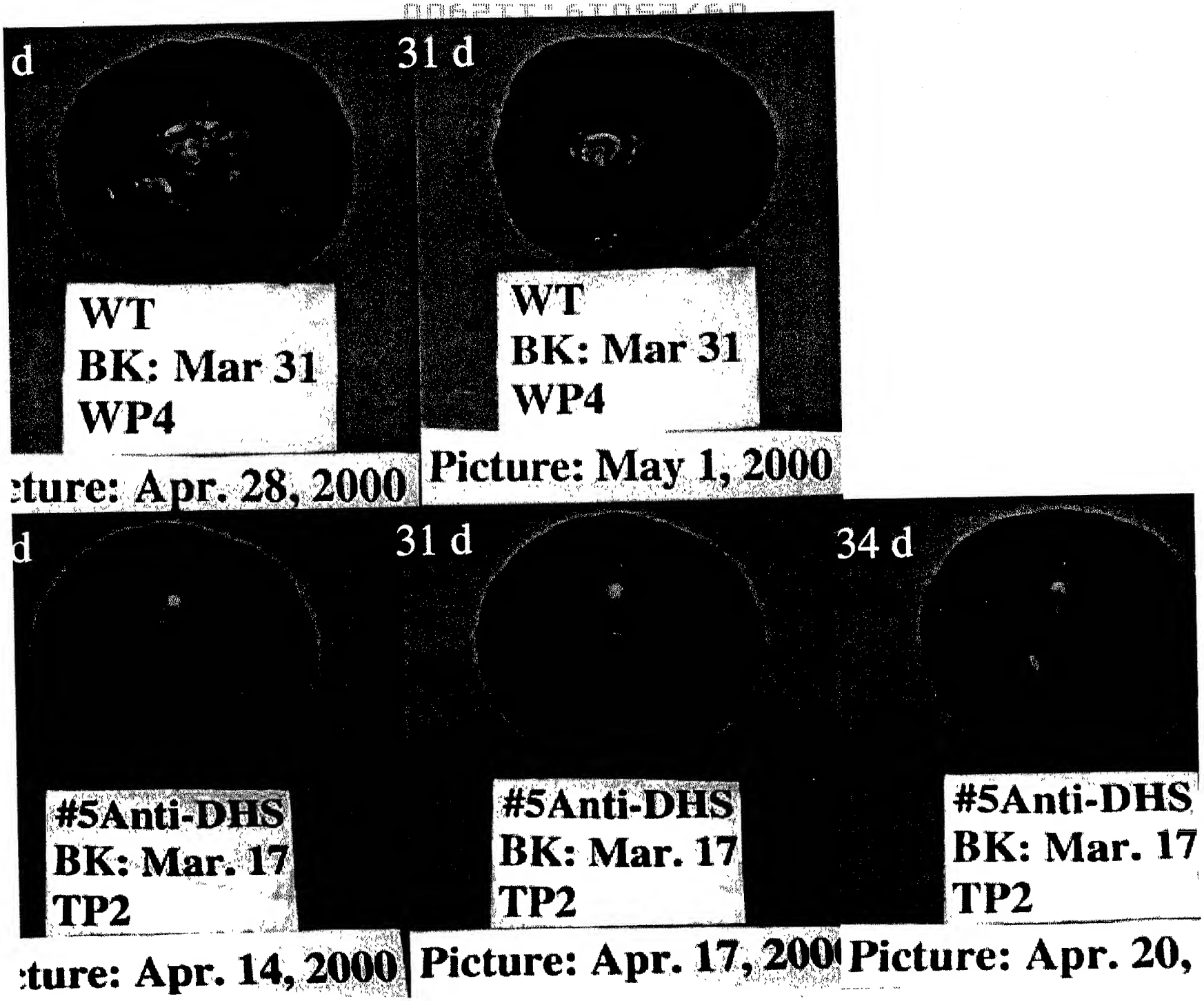

d
31 d
WT
BK: Mar 31
WP4
:ture: Apr. 28, 2000
WT
BK: Mar 31
WP4
Picture: May 1, 2000
d
31 d
34 d
#5Anti-DHS
BK: Mar. 17
TP2
:ture: Apr. 14, 2000
#5Anti-DHS
BK: Mar. 17
TP2
Picture: Apr. 17, 200
#5Anti-DHS
BK: Mar. 17
TP2
Picture: Apr. 20,

Figure 35

Arabidopsis 3'-end DHS for antisense

Nucleotide and derived amino acid sequence

```
TGCACGCCCTGATGAAGCTGTGTCTTGGGGTAAAATTAGGGGTTCTGCTAAAACCGTTAAGGTCTGCTTTT
  A  R  P  D  E  A  V  S  W  G  K  I  R  G  S  A  K  T  V  K  V  C  F

TAATTTCTTCACATCCTAATTTATATCTCACTCAGTGGTTTTGAGTACATATTTAATATTGGATCATTCTT
L  I  S  S  H  P  N  L  Y  L  T  Q  W  F

GCAGGTATACTGTGATGCTACCATAGCCTTCCCATTGTTGGTTGCAGAAACATTTGCCACAAAGAGAGACC
AAACCTGTGAGTCTAAGACTTAAGAACTGACTGGTCGTTTTGGCCATGGATTCTTAAAGATCGTTGCTTTT
TGATTTTACACTGGAGTGACCATATAACACTCCACATTGATGTGGCTGTGACGCGAATTGTCTTCTTGCGA
ATTGTACTTTAGTTTCTCTCAACCTAAAATGATTTGCAGATTGTGTTTTCGTTTAAAACACAAGAGTCTTG
TAGTCAATAATCCTTTGCCTTATAAAATTATTCAGTTCCAACAAAAAAAAAAAAAAAA
```

Nucleotide sequence

```
TGCACGCCCTGATGAAGCTGTGTCTTGGGGTAAAATTAGGGGTTCTGCTAAAACCGTTAAGGTCTGCTTTT
TAATTTCTTCACATCCTAATTTATATCTCACTCAGTGGTTTTGAGTACATATTTAATATTGGATCATTCTT
GCAGGTATACTGTGATGCTACCATAGCCTTCCCATTGTTGGTTGCAGAAACATTTGCCACAAAGAGAGACC
AAACCTGTGAGTCTAAGACTTAAGAACTGACTGGTCGTTTTGGCCATGGATTCTTAAAGATCGTTGCTTTT
TGATTTTACACTGGAGTGACCATATAACACTCCACATTGATGTGGCTGTGACGCGAATTGTCTTCTTGCGA
ATTGTACTTTAGTTTCTCTCAACCTAAAATGATTTGCAGATTGTGTTTTCGTTTAAAACACAAGAGTCTTG
TAGTCAATAATCCTTTGCCTTATAAAATTATTCAGTTCCAACAAAAAAAAAAAAAAAA
```

ARPDEAVSWGKIRGSAKTVKVCFLISSHPNLYLTQWF

Figure 36

Tomato 3'-end-Deoxyhupsine synthase used for antisense

Nucleotide and derived amino acid sequence

GGTGCTCGTCCTGATGAAGCTGTATCATGGGGAAAGATACGTGGTGGTGCCAAGACTGTGAAGGTGCATTGTGATGCAAC
G A R P D E A V S W G K I R G G A K T V K V H C D A T

CATTGCATTTCCCATATTAGTAGCTGAGACATTTGCAGCTAAGAGTAAGGAATTCTCCCAGATAAGGTGCCAAGTTTGAA
I A F P I L V A E T F A A K S K E F S Q I R C Q V

CATTGAGGAAGCTGTCCTTCCGACCACACATATGAATTGCTAGCTTTTGAAGCCAACTTGCTAGTGTGCAGCACCATTTA
TTCTGCAAAACTGACTAGAGAGCAGGGTATATTCCTCTACCCCGAGTTAGACGACATCCTGTATGGTTCAAATTAATTAT
TTTTCTCCCCTTCACACCATGTTATTTAGTTCTCTTCCTCTTCGAAAGTGAAGAGCTTAGATGTTCATAGGTTTTGAATT
ATGTTGGAGGTTGGTGATAACTGACTAGTCCTCTTACCATATAGATAATGTATCCTTGTACTATGAGATTTTGGGTGTGT
TTGATACCAAGGAAAAATGTTTATTTGGAAAACAATTGGATTTTTAATTTAAAAAAAATTGNTTAAAAAAAAAAAAAAA

Nucleotide sequence

GGTGCTCGTCCTGATGAAGCTGTATCATGGGGAAAGATACGTGGTGGTGCCAAGACTGTGAAGGTGCATTGTGATGCAAC
CATTGCATTTCCCATATTAGTAGCTGAGACATTTGCAGCTAAGAGTAAGGAATTC

TCCCAGATAAGGTGCCAAGTTTGAACATTGAGGAAGCTGTCCTTCCGACCACACATATGAATTGCTAGCTTTTGAAGCCA
ACTTGCTAGTGTGCAGCACCATTTATTCTGCAAAACTGACTAGAGAGCAGGGTATATTCCTCTACCCCGAGTTAGACGAC
ATCCTGTATGGTTCAAATTAATTATTTTTCTCCCCTTCACACCATGTTATTTAGTTCTCTTCCTCTTCGAAAGTGAAGAG
CTTAGATGTTCATAGGTTTTGAATTATGTTGGAGGTTGGTGATAACTGACTAGTCCTCTTACCATATAGATAATGTATCC
TTGTACTATGAGATTTTGGGTGTGTTTGATACCAAGGAAAAATGTTTATTTGGAAAACAATTGGATTTTTAATTTAAAAA
AAATTGNTTAAAAAAAAAAAAAAA

Figure 37

600 bp Arabidopsis Deoxyhypusine Synthase Probe

Primer1 (underlined)

GGTGGTGTTGAGGAAGATCTCATAAAATGCCTTGCACCTACATTTAAAGGTGATTTCTCTCTACCTGGAGC
TTATTTAAG
G G V E E D L I K C L A P T F K G D F S L P G A
Y L R
GTCAAAGGGATTGAACCGAATTGGGAATTTGCTGGTTCCTAATGATAACTACTGCAAGTTTGAGGATTGGA
TCATTCCCA
S K G L N R I G N L L V P N D N Y C K F E D W I
I P
TCTTTGACGAGATGTTGAAGGAACAGAAAGAAGAGAATGTGTTGTGGACTCCTTCTAAACTGTTAGCACGG
CTGGGAAAA
I F D E M L K E Q K E E N V L W T P S K L L A R
L G K
GAAATCAACAATGAGAGTTCATACCTTTATTGGGCATACAAGATGAATATTCCAGTATTCTGCCCAGGGTT
AACAGATGG
E I N N E S S Y L Y W A Y K M N I P V F C P G L
T D G
CTCTCTTAGGGATATGCTGTATTTTCACTCTTTTCGTACCTCTGGCCTCATCATCGATGTAGTACAAGATA
TCAGAGCTA

S L R D M L Y F H S F R T S G L I I D V V Q D I
R A
TGAACGGCGAAGCTGTCCATGCAAATCCTAAAAAGACAGGGATGATAATCCTTGGAGGGGGCTTGCCAAAG
CACCACATA
M N G E A V H A N P K K T G M I I L G G G L P K
H H I
TGTAATGCCAATATGATGCGCAATGGTGCAGATTACGCTGTATTTATAAACACCGGGCAAGAATTTGATGG
GAGCGACTC
C N A N M M R N G A D Y A V F I N T G Q E F D G
S D S
GGGTGCACGCCCTGATGAAGC
G A R P D E

Primer 2 (underlined)

Figure 38

483 bp Carnation Deoxyhypusine Synthase Probe

```
GAAGATCCATCAAGTGCCTTGCACCCACTTTCAAAGGCGATTTTGCCTTACCAGGAGCTCAATTACGCTCC
                                    AAAGGGT
 R  R  S  I  K  C  L  A  P  T  F  K  G  D  F  A  L  P  G  A  Q  L  R  S
                                    K  G

TGAATCGAATTGGTAATCTGTTGGTTCCGAATGATAACTACTGTAAATTTGAGGATTGGATCATTCCAATT
                                    TTAGATA
 L  N  R  I  G  N  L  L  V  P  N  D  N  Y  C  K  F  E  D  W  I  I  P  I
                                    L  D

AGATGTTGGAAGAGCAAATTTCAGAGAAAATCTTATGGACACCATCGAAGTTGATTGGTCGATTAGGAAGA
                                    GAAATAA
 K  M  L  E  E  Q  I  S  E  K  I  L  W  T  P  S  K  L  I  G  R  L  G  R
                                    E  I

ACGATGAGAGTTCATACCTTTACTGGGCCTTCAAGAACAATATTCCAGTATTTTGCCCAGGTTTAACAGAC
                                    GGCTCAC
 N  D  E  S  S  Y  L  Y  W  A  F  K  N  N  I  P  V  F  C  P  G  L  T  D
                                    G  S

TCGGAGACATGCTATATTTTCATTCTTTTCGCAATCCGGGTTTAATCATCGATGTTGTGCAAGATATAAGA
                                    GCAGTAA

 L  G  D  M  L  Y  F  H  S  F  R  N  P  G  L  I  I  D  V  V  Q  D  I  R
                                    A  V

ATGGCGAGGCTGTGCACGCAGCGCCTAGGAAAACAGGCATGATTATACTCGGTGGAGGGTTGCCTAAGCAC
                                    CACATCT
 N  G  E  A  V  H  A  A  P  R  K  T  G  M  I  I  L  G  G  G  L  P  K  H
                                    H  I

GCAACGCAAACATGATGAGAAATGGCGCCGATTATGCTGTTTTCATCAACACCG
 C  N  A  N  M  M  R  N  G  A  D  Y  A  V  F  I  N  T
```

A full-length cDNA clone was obtained by screening a carnation senescing petal cDNA library with this probe.

Figure 39

Figure 40A

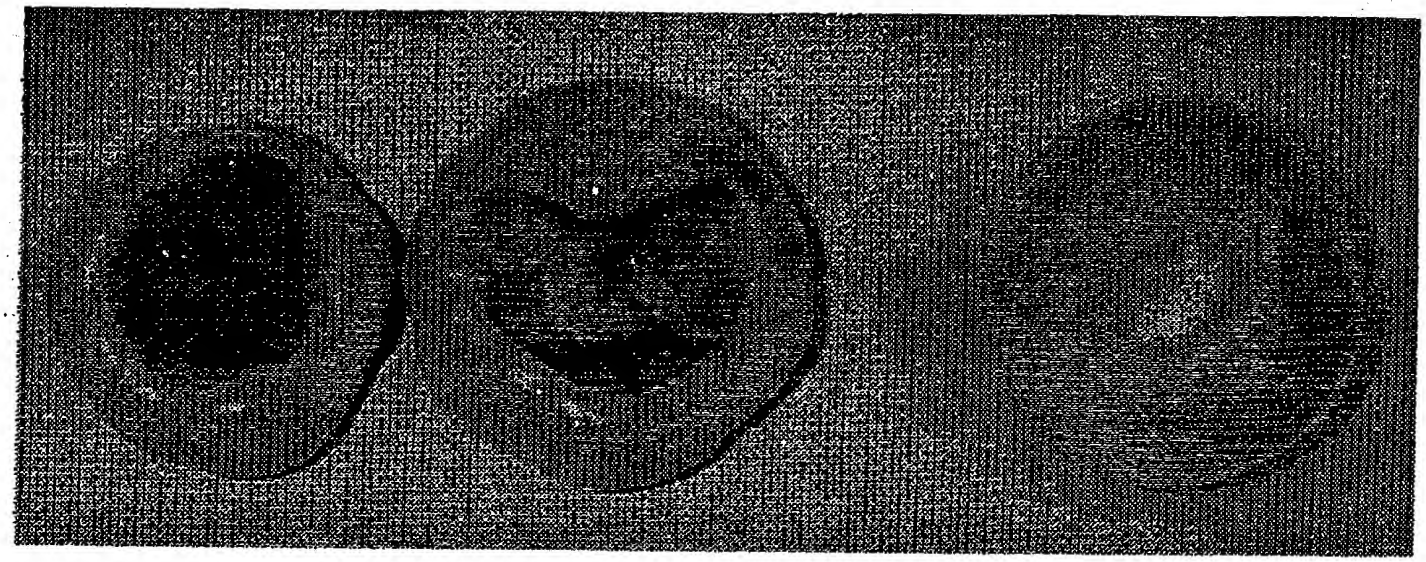


Figure 40 B